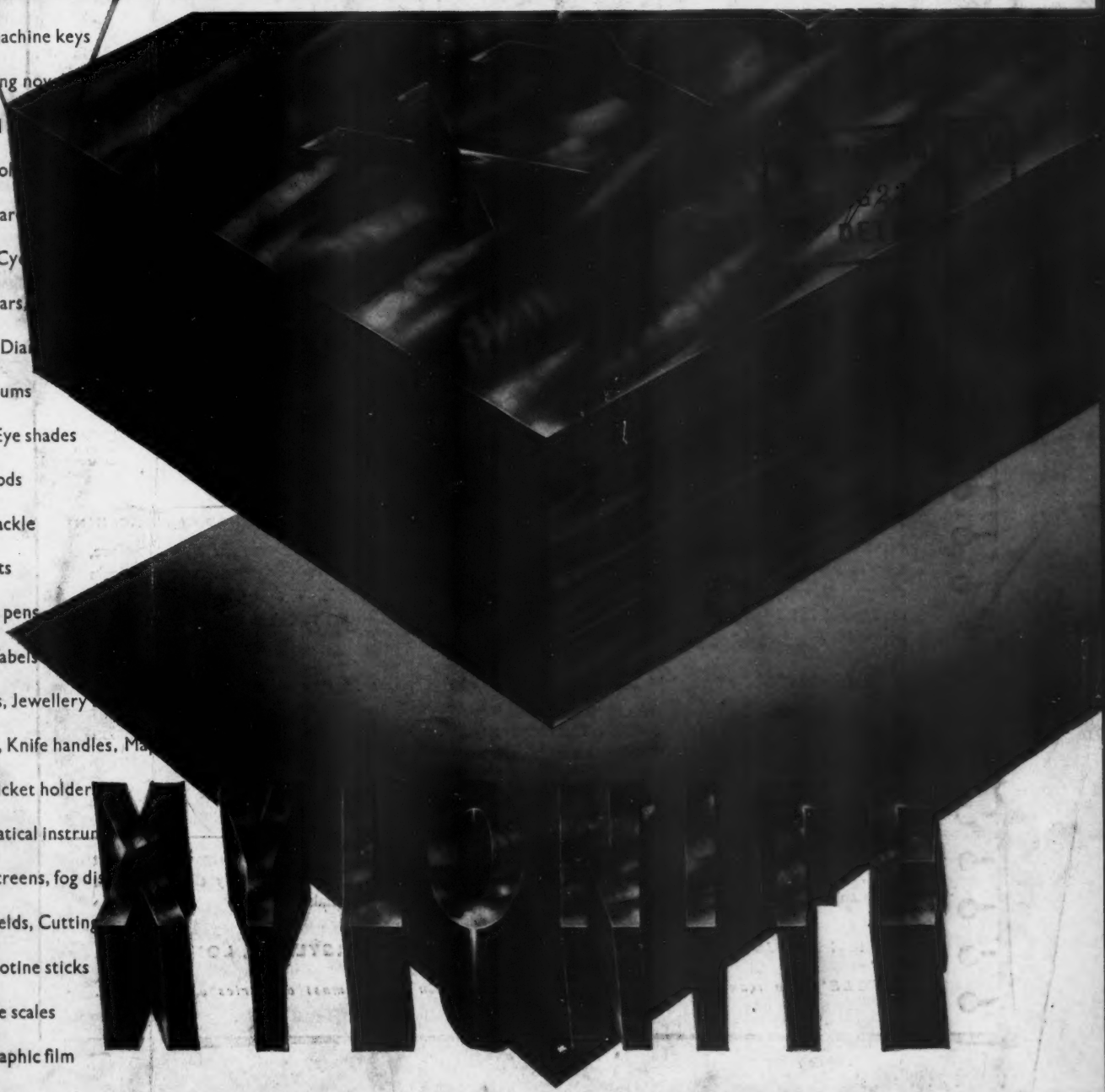
Plastics

DEALING WITH THE MANUFACTURE, USES AND POTENTIALITIES OF PLASTIC MATERIALS

Adding machine keys
Advertising nov
Animated
Cards, Co
Colour car
Combs, Cy
handle bars,
tail flaps, Dia
Dolls, Drums
Eyelets, Eye shades
Fancy goods
Fishing tackle
and Floats
Fountain pens
Garden labels
Hair pins, Jewellery
Key tags, Knife handles, Ma
Season ticket holder
Mathematical instrum
Motor screens, fog di
glare shields, Cutting
and guillotine sticks
Pen knife scales
Photographic film
Piano keys
Poultry rings

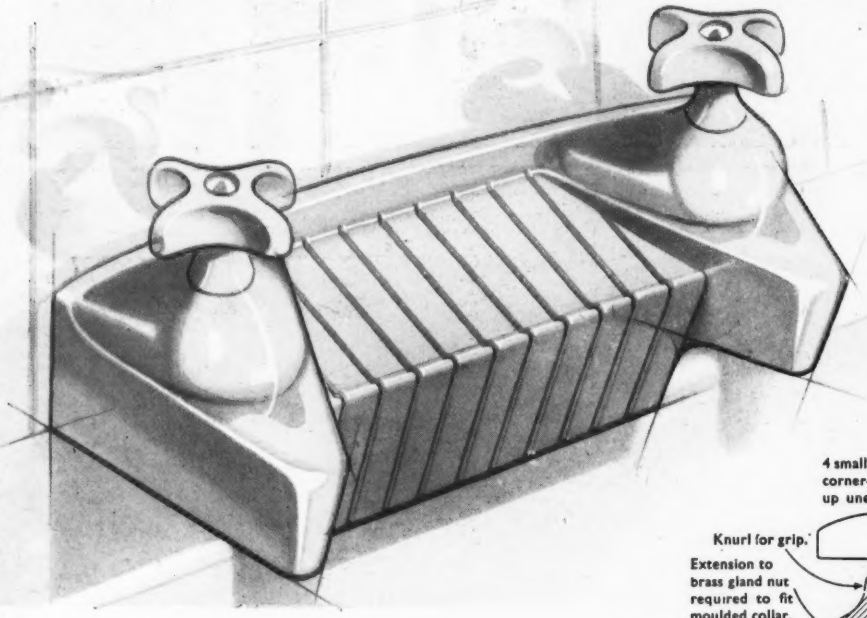


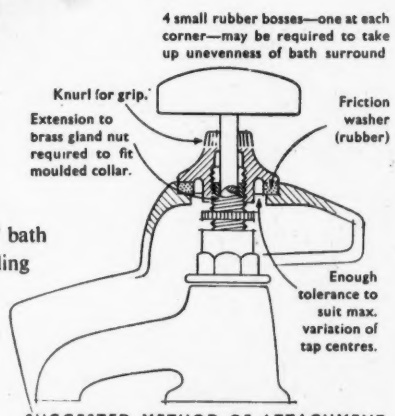
In sheet rod and tube, for strength and beauty

BX PLASTICS LTD., CHINGFORD, LONDON, E 4

Designer's Diary No. 1

This is the first in a series of indicative designs for moulded plastics articles by the B.I.P. Product Design Unit. The series seeks to illustrate how technical requirements can be met to produce pleasing, readily mouldable articles. Reprints of these announcements will be supplied on request.




4 small rubber bosses—one at each corner—may be required to take up unevenness of bath surround
Knurl for grip.
Extension to brass gland nut required to fit moulded collar.
Friction washer (rubber)
Enough tolerance to suit max. variation of tap centres.

SUGGESTED METHOD OF ATTACHMENT

The Product. The bathroom tap unit is designed to 'tidy up' bath faucets, with a saving in production costs. Savings are effected by shrouding the metal faucets, thus enabling them to be reduced to a minimum section, consistent with castability; by eliminating the need for fettling, filing, polishing and plating.

The Design. The main component of the product is long and rather shallow and might have been conceived in flowing curves. This treatment, though perhaps aesthetically pleasing, would adversely affect strength. Note, therefore, the drastic changes in form, incorporated to obtain maximum strength and rigidity. Even the small drain channels contribute, forming natural strengthening ribs on the flat underside. The diagram illustrates how the shroud is held in position by a moulded collar screwed down on to the tap. The design is of a simple nature for ease of moulding in straightforward up-and-down moulds.

The Material. 'Beetle' Melamine moulding powder is chosen for its excellent resistance to water, particularly hot water. Nevertheless, some contraction and expansion of the moulding will take place, due to changes of temperature and humidity. This could result in distortion, or even cracking, were not provision made for it by the silicon rubber washer, on which the moulding can 'float' *(see diagram)*.

No polishing for housewives, either, this way. The moulding can be cleaned in a trice with a damp cloth.

The B.I.P. Technical Advisory Service will assist moulders in problems which may arise regarding product design, mould design, materials and moulding techniques. This consultative service is freely offered, without obligation, and applies to moulding in thermoplastic as well as thermosetting materials.

BRITISH INDUSTRIAL PLASTICS LIMITED B·I·P GROUP **1 ARGYLL ST., LONDON, W.1**

'BEETLE' is a trade mark registered in Great Britain and in most countries of the world.

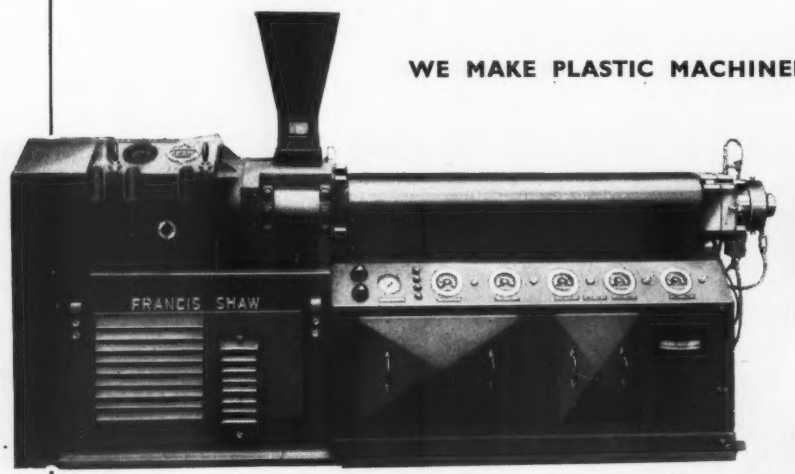
BIRKBYS LTD. LIVERSEDGE YORKSHIRE
London Office :- 79 Baker Street W.1.

"You cannot drive a windmill with a pair of bellows . . . . ."

OLD ENGLISH PROVERB

You must have the best equipment for the job in hand—and nowadays that means the most advanced in design and most easily operated. The SHAW range of Extruders for plastic material such as P.V.C., acetate, polystyrene, etc., incorporates many novel practical features which every user will appreciate—barrels and nozzles electrically heated and controlled—scrolls of modern design fitted with tachometer scroll-speed indicators—driven by variable-speed motors, obtaining a wide range of scroll speeds and other features.

WE MAKE PLASTIC MACHINERY FOR ALL PURPOSES



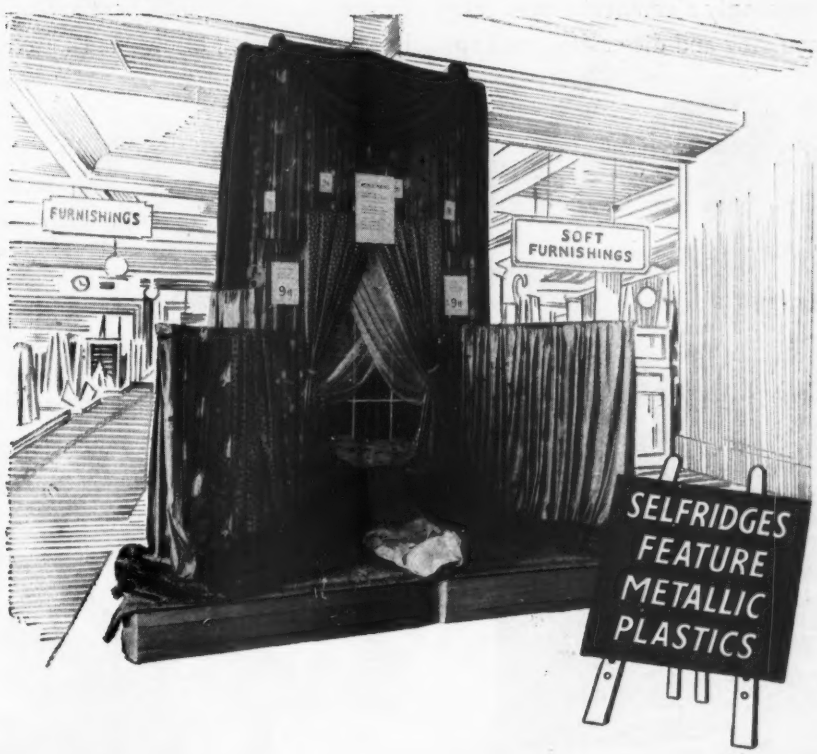
SHAW

The illustration shows our 4½" Plastic Extruder

FRANCIS SHAW & COMPANY LIMITED

MANCHESTER 11 · ENGLAND

R198



Geon *in the news again!*

AND it is good news, too, for future sales of kitchen or bathroom curtainings. For these new, gaily printed "metallic" plastics, by Kleinerts, are made with Geon! This means they are not only fadeless, tough and long lasting, but completely resistant to grease and many staining liquids. Moreover, they drape well, cannot perish, crack or spoil in a steamy atmosphere — and will never need laundering. Just an occasional rinsing will keep them spotless. All plastic products made with Geon PVC have these same outstanding qualities—tablecloths, rainwear, cycling capes, leathercloth for upholstery or panelling, floorcoverings and tiles, protective clothing and electric wiring. All, furthermore, can be resistant to fire and are practically unaffected by acids, petrol and oil. Geon can be processed in any colour and printed or embossed with any design. Please write for Booklet 51, which details the properties and uses of Geon polyvinyl materials.

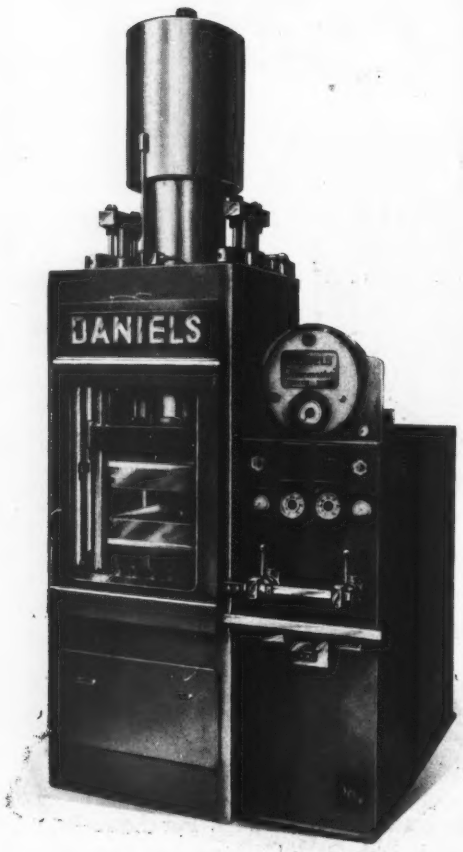
Geon
Polyvinyl Materials

The new "Illusion" metallic plastics shown, by kind permission of Selfridges Ltd., are produced by Kleinerts from PVC sheeting, made with Geon by The Greenwich Leathercloth Co. Ltd. "Geon" is a Regd. Trade Mark

BRITISH GEON LIMITED *Sales and Technical Service, 21 St. James's Square, London, S.W.1. Tel: Whitehall 9561*

MOULDING PRESSES

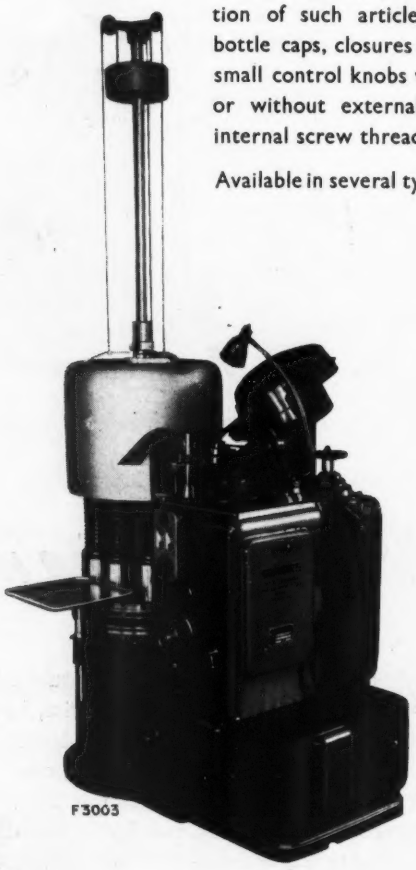
We supply a comprehensive range of machines and equipment for plastic moulding and die-casting, and specialise in the design of dies and moulds.



Illustrated above is the new enclosed-type Daniels 75-ton Transfer Press fitted with the recently developed Daniels Automatic Process Timer. Daniels Presses are available in a range of types and sizes from 12 to 250 tons loading.

Lower illustration shows the Tavannes Automatic 5-ton Moulding Press, which has been designed for the quantity production of such articles as bottle caps, closures and small control knobs with or without external or internal screw threads.

Available in several types.



Send for illustrated catalogues.

ALFRED HERBERT LTD

FACTORED DIVISION · RED LANE · COVENTRY · 'PHONE: 89221 (10 lines)

SOLE AGENTS FOR PLASTICS MACHINERY IN GREAT BRITAIN, INDIA, PAKISTAN, FRANCE AND ITALY FOR:—

T. H. & J. DANIELS LTD., STROUD, GLOS.

SOLE AGENTS:

REED-PRENTICE CORPORATION, WORCESTER, MASS., U.S.A.

ALSO IN UNITED KINGDOM & EIRE FOR TAVANNES MACHINES CO. S.A., TAVANNES, SWITZERLAND

Ask Crystalate to quote for Your job in Moulded Plastics

CRYSTALATE

PLASTIC MOULDERS, FABRICATORS & TOOLMAKERS SINCE 1899

Crystalate Ltd., Crystalate House, Mill Lane, Tonbridge, Kent. *Phone : Tonbridge 2261/2/3/4/5.*

M&B
INDUSTRIAL CHEMICALS · PHARMACEUTICAL CHEMICALS · AROMATIC MATERIALS · HORTICULTURAL PRODUCTS · PHOTOGRAPHIC CHEMICALS

M&B CHEMICALS *for* INDUSTRY

PEARL PASTE-M&B

for the production of a pearl effect in plastic material

Pearl Paste has been used with particular success in conjunction with casein plastics. Approximately 5 per cent. in the form of a homogeneous cream, to which the desired dyestuff has been added, is mixed with the dry casein prior to extrusion in the form of rods, which are subsequently compressed into sheets under the influence of pressure and heat.

May we send you a copy of 'M&B Chemicals in Industry'? It contains monographs on over sixty M&B products.

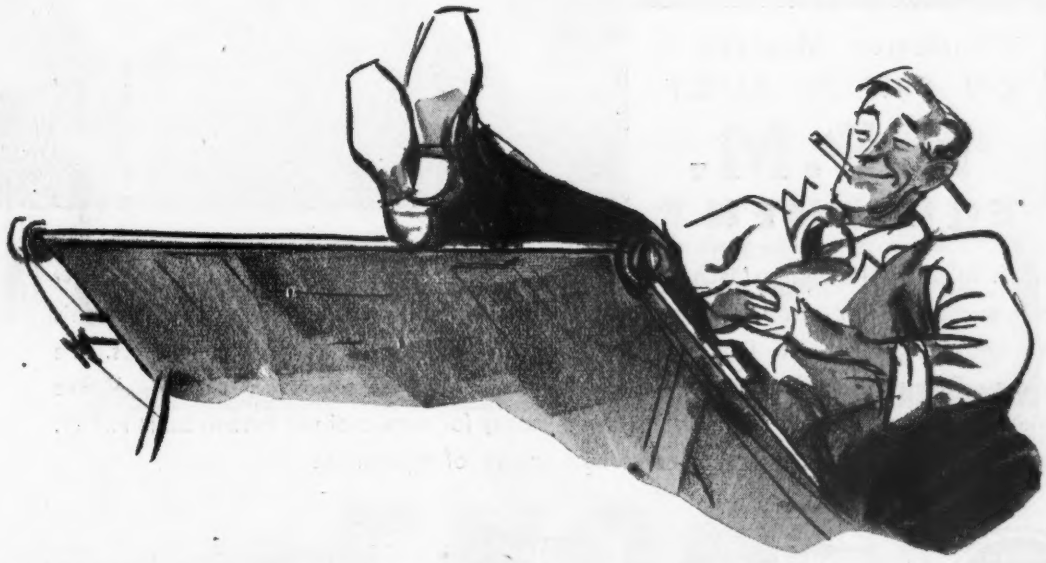
enquiries to

MAY & BAKER LTD

DAGENHAM · *Telephone*: ILFORD 3060 *Ext* 219

He used to do it the hard way,

....now he leaves it to Lorival

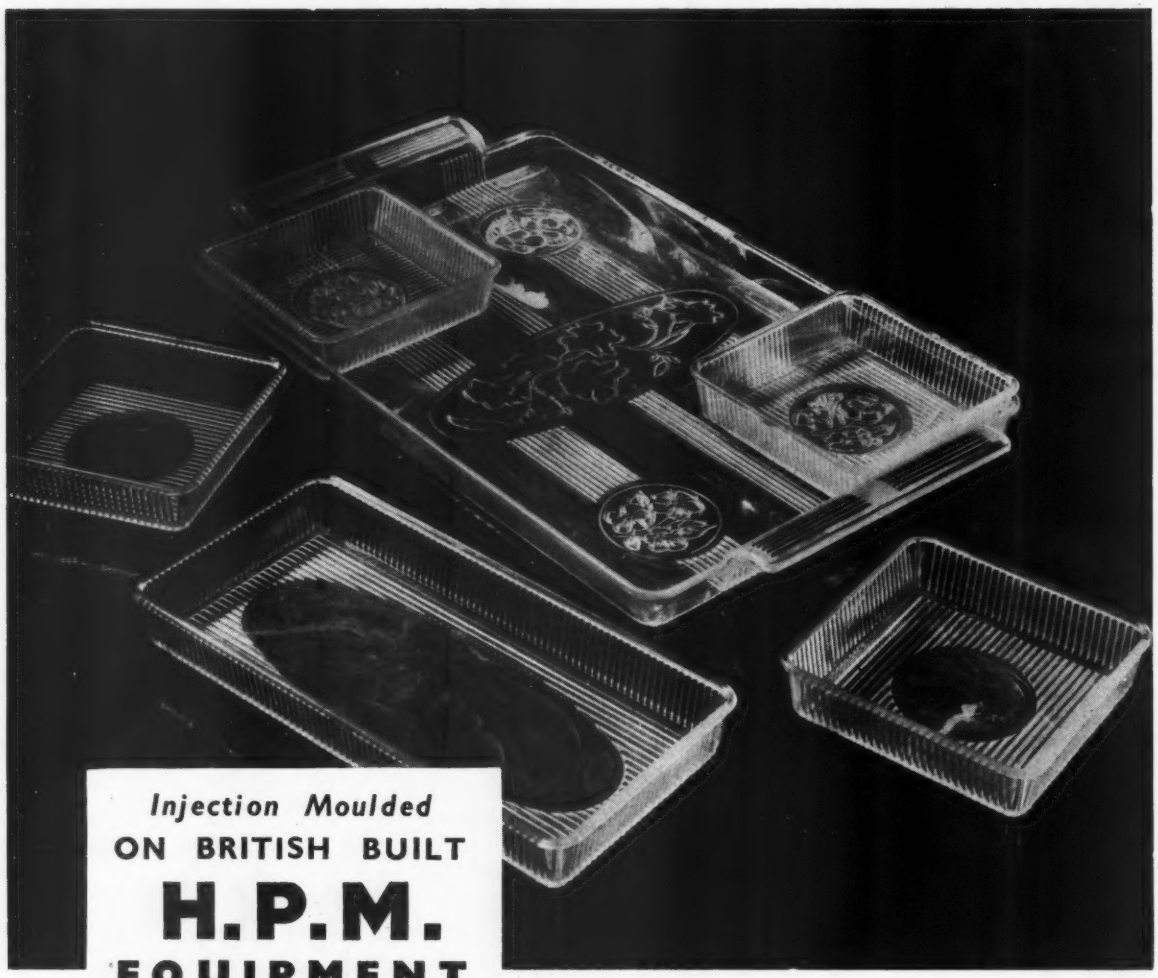


L.18

A plastic or ebonite moulding cannot be better than the tool by which it is made. It is logical, therefore, that component design and tool design should work together. Lorival will tell you just what can be done on your job when they see your drawing, but please call us in at an early stage.

LORIVAL PLASTICS

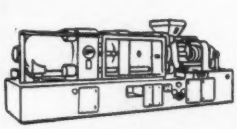
UNITED EBONITE & LORIVAL LTD · LITTLE LEVER · NR. BOLTON · LANCS.

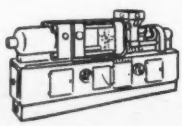


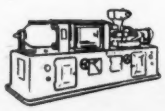
Injection Moulded
ON BRITISH BUILT
H.P.M.
EQUIPMENT

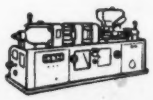
H.P.M. Injection Moulding Machines open up new markets for the plastics moulder. Size and weight are no longer limiting factors. Refrigerator parts, radio cabinets, toilet seats, large instrument housings are typical examples which can now be moulded on a production basis with the new British built H.P.M. equipment. There's a big demand for large plastic parts, are you prepared to make them? Write today for details of the British built H.P.M. range of equipment.

BRITISH HPM BUILT


60 ounce


32 ounce


16 ounce


10 ounce

Manufactured under licence by John Shaw & Sons (Salford) Ltd., Salford 3, Lancs.

Selling Agents
A. C. WICKMAN LIMITED, COVENTRY
LONDON · BRISTOL · BIRMINGHAM · MANCHESTER
LEEDS · GLASGOW · NEWCASTLE · BELFAST

A.C. Wickman LIMITED

150 F9

FOR THOSE CONCERNED WITH DEFENCE CONTRACTS

AN UNRIVALLED SERVICE FOR THE SOLUTION OF ANY MOULDING PROBLEM

Many managements are faced with revised programmes brought about by the demands of recent defence measures. For contracts requiring the supply of high quality, high precision injection or compression mouldings, Ekco Plastics, suppliers to the Admiralty and Ministry of Supply, are ready for immediate action.

Ekco Plastics also relieve you of the responsibilities of Government test and inspection; their inspection staff are officially approved by A.I.D, Admiralty and all other Government Departments.

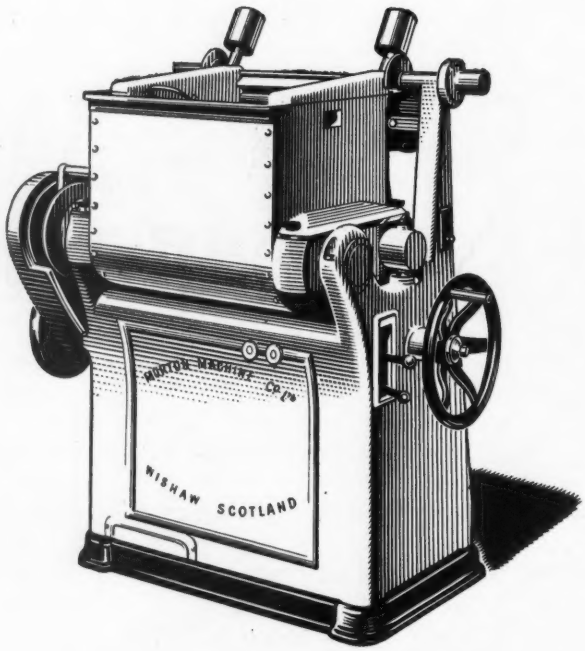
CONSULT EKCO PLASTICS

Members of the British Plastics Federation and the Society of the Plastics Industries of America.

E · K · COLE LTD. *(Plastics Division)* SOUTHEND-ON-SEA

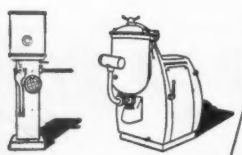
B

£ for production with profit

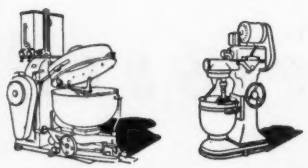


mix with Morton

When production depends on successful mixing, production can depend on Morton. For Morton mixers are built on sound engineering principles to withstand the heaviest demands in the most testing conditions. All the models in the Morton range have been adapted for a wide variety of applications and Morton designers can design special purpose machines if required. Regular operating efficiency is ensured by after-sales service of Morton engineers. When profits depend on successful mixing, ask our area representative to call—he will advise you on any mixing problem.



Morton
MACHINE CO., LTD.
OF WISHAW SCOTLAND



Mixing is our business

Whatever your requirements in Extruded Plastics we can make them for you—promptly and economically.

From the blue-print stage, from your notes, or even from your verbal description we can supply "just the job."

Why not get into touch with us and investigate the limitless possibilities of Polyvinyl Chloride for your productions?

MELPLAS

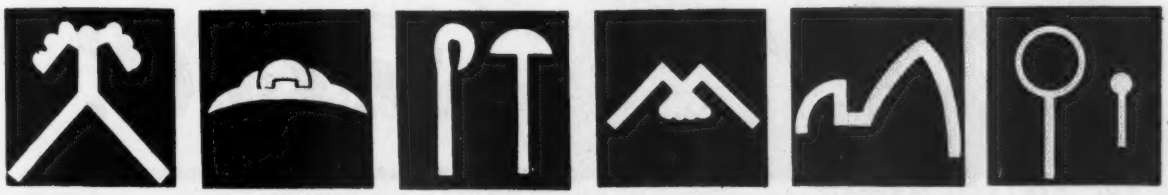
Extruded Plastics

Rigid—and Flexible

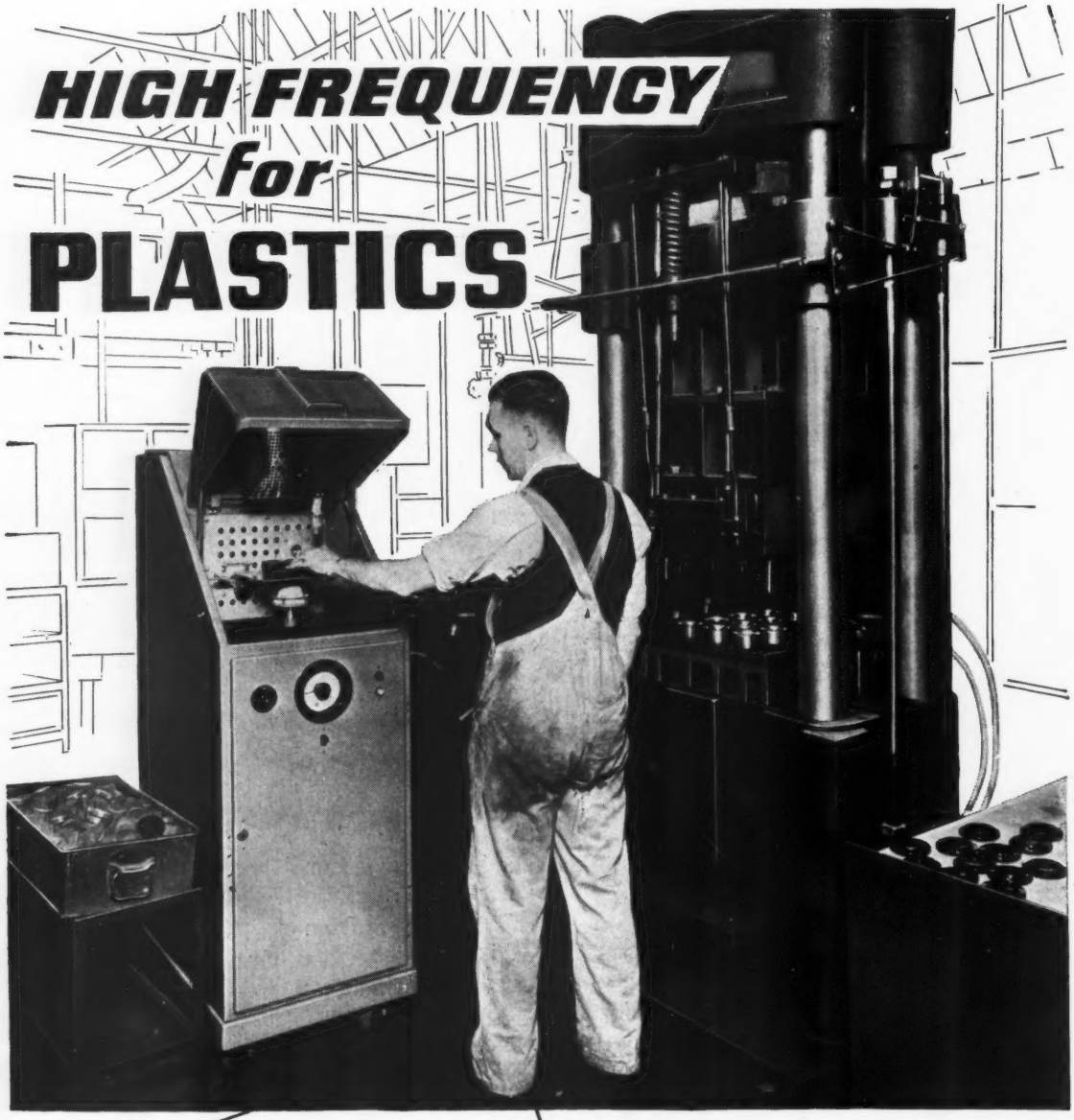
MELWOOD THERMOPLASTICS LTD.

Willoughby Road, Harpenden, Herts.

Tel.: HARPENDEN 300



HIGH FREQUENCY for PLASTICS



2 kW Plastic Pre-Heater

High Frequency heating is recognised throughout the Plastics moulding industry as a most effective way of increasing productivity.

Now the G.E.C. 2 kW Plastic Pre-heater, with its robust construction and single valve oscillatory circuit sets a new low standard in maintenance costs.

Leaflet **PH1130** explains fully the many features of this recent addition to the range of G.E.C. High Frequency generators.

by G.E.C.

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

Plastic Mouldings?

Enquiry

Quote

Order

Tools

Approval of Samples

Production

all Under One Roof

all in a few weeks

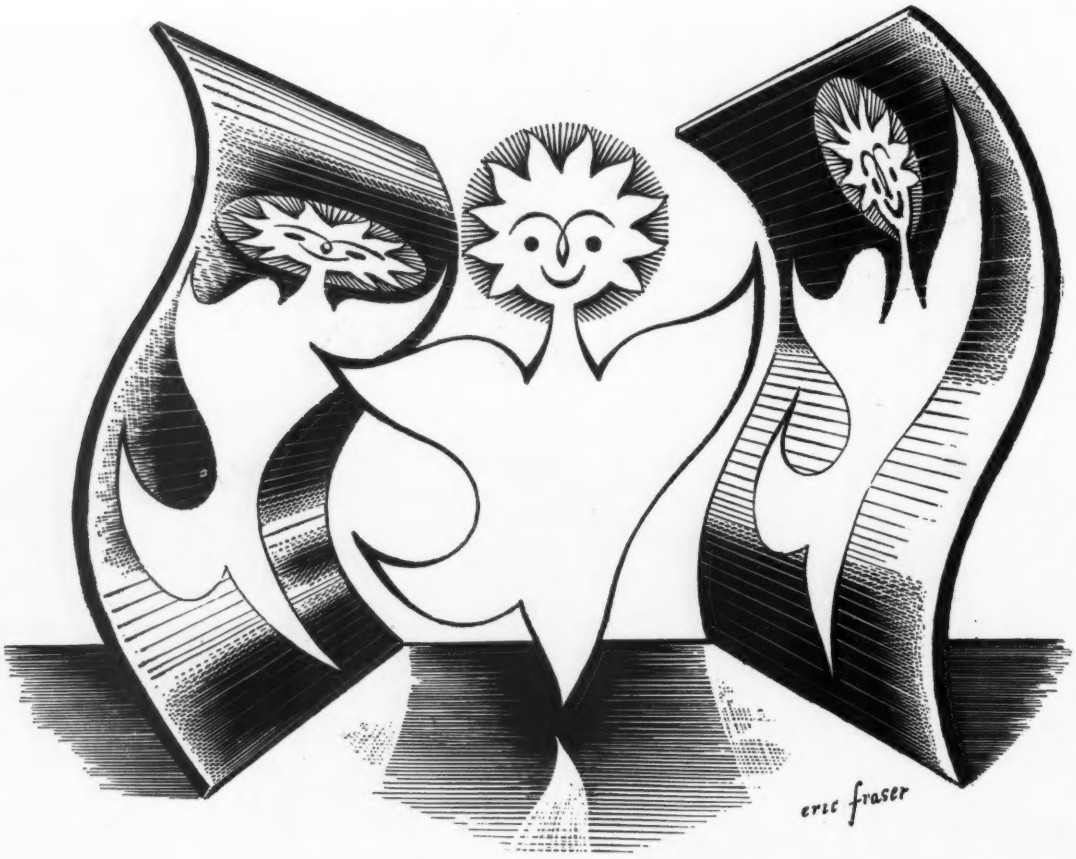
RM SERVICE and DEPENDABILITY

ROOTES

Mouldings Limited

SLOUGH, BUCKS

Telephone: SLOUGH 22349



'FLEXIBLE' IS MY MIDDLE NAME! says Mr. Therm

The gas and gas-heated equipment that Mr. Therm brings in his train are amazingly flexible in their applications to all sorts of heating problems. What other fuel but gas could give you a tiny—but steady—pin-point of flame or full heat the instant you want it? And gas can be controlled at the flick of a finger—or can be completely automatic if required. It needs no storage space, is smokeless and ash-free, and works unfailingly for you with remarkable efficiency. No wonder Mr. Therm is to be found hard at work in so many industries!

In particular, the plastics industry has many reasons to be thankful for Mr. Therm's skilled assistance, and one reason is shown in the accompanying photograph. This compact layout of high pressure gas connections, at the works of Messrs. A. F. Bulgin & Co. Ltd., Barking, takes complete care, with its own thermostatic controls, of the heating of platens for moulding parts of electric switches. In a restricted layout such as this, gas provides the perfect answer to many of the plastics industry's heating problems.

MR. THERM BURNS TO SERVE YOU! THE GAS COUNCIL · 1 GROSVENOR PLACE · LONDON · SW1

FIX YOUR BONDING PROBLEMS with . . . TITEBOND

A typical TITEBOND application : "FORMICA" (Regd.) laminated plastic, metal trimmed, counters and showcases constructed by DUNSTABLE SHOWCASES LTD. Illustrations by courtesy of DUNSTABLE SHOWCASES LTD.

★ TITEBOND is the time-saving and labour-saving all-purpose bonding medium for the Plastics Industry. Based on one of the new synthetic rubbers, specially treated and compounded, TITEBOND has outstanding adhesive qualities and gives very strong bonds. Its many invaluable qualities include flexibility to prevent cracking of materials, resistance to temperature variations. Can be easily applied by brushing, spraying or spreading. A TITEBOND is a bond for good.

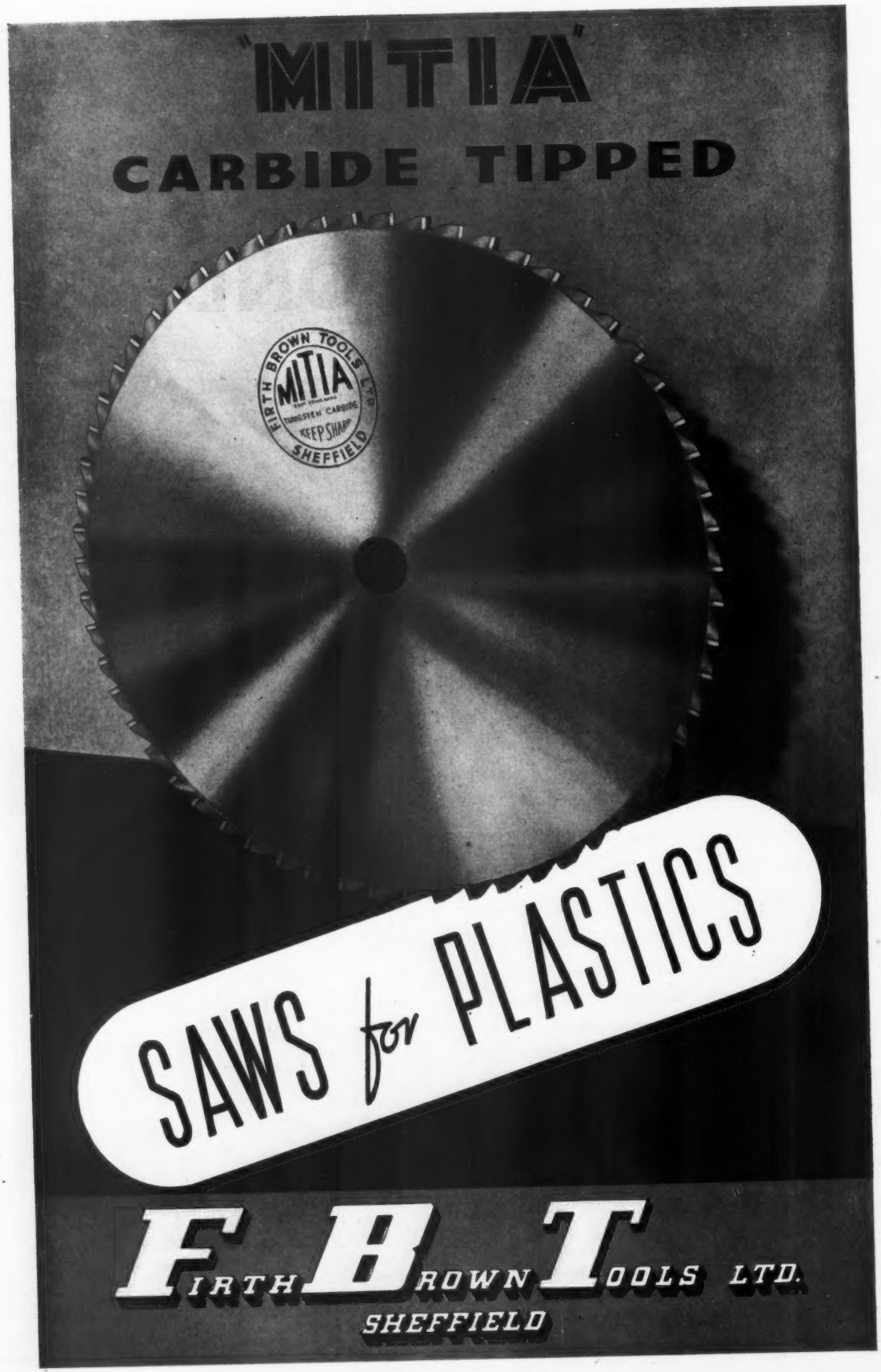
TITEBOND *adhesive*

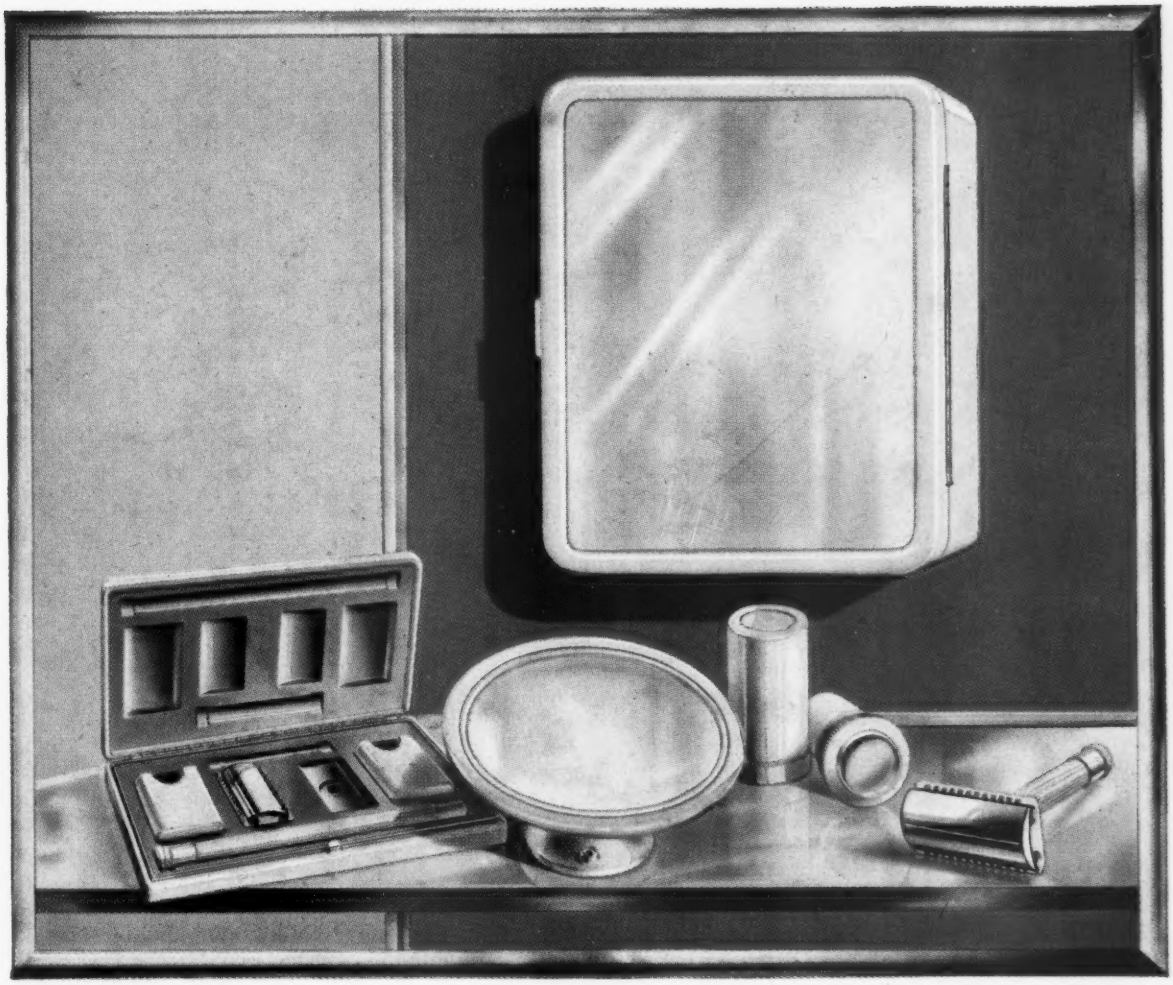
for bonding Plastics to Plastics, such as "FORMICA" (Regd.), Plastics to Metal, Metal to Metal, Glass to Fabric, Fabric to Wood, Fabric to Fabric, Leather to Leather, Leather to Paper, Paper to Metal, etc.

Write for full technical details and prices to Dept. 3

SURRIDGE'S PATENTS LIMITED

NEW WORKS · CROYDON ROAD · ELMERS END · BECKENHAM · KENT · *Tel.: Beckenham 0168*


"MITIA"
CARBIDE TIPPED
FIRTH BROWN TOOLS LTD
MITIA
TUNGSTEN CARBIDE
KEEP SHARP
SHEFFIELD
SAWS for PLASTICS
FIRTH BROWN TOOLS LTD.
SHEFFIELD



Artistry in Plastics

"Roanoid," the original production in plastic hardware, combines the strength of metal with the beauty of plastics, and is your guarantee of quality and service. We are able to produce to customers' own specifications a wide range of utility articles for everyday use and would be glad to arrange for a representative to call and see you to discuss your particular problem. Why not contact us NOW?

ROANOID PLASTICS LIMITED

Injection, Compression, Fabrication and Extrusion Moulding

KINGS ROAD, TYSELEY, BIRMINGHAM, 11. *TELEPHONE: ACOcks GREEN 2816 (5 LINES).* *TELEGRAMS: COLORITE, BIRMINGHAM*
AND AT HILLINGTON, GLASGOW, S.W.2.

C

FABRICATORS in PLASTICS

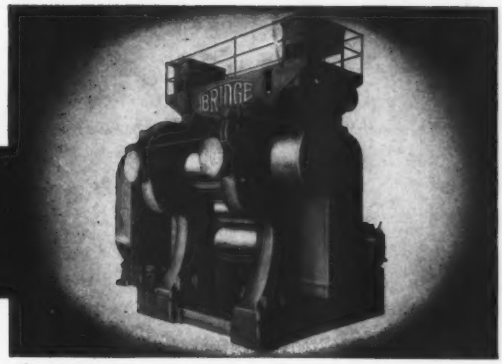
Our modern factory is extensive and equipped with the latest Plastic fabricating plant. It is self-contained, including Toolroom, Technical and Experimental Departments and employs technicians and designers.

We are manufacturers of Plastic components for all Government Departments and are approved by A.I.D. and Air Registration Board.

Our field of activity covers the fabrication of Industrial Laminated Plastic Materials and Decorative Laminated Plastic Materials.

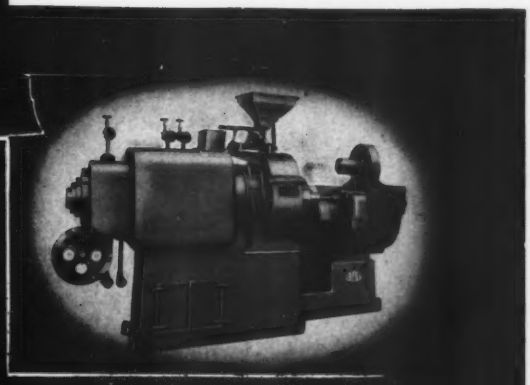
INSULATION EQUIPMENTS LTD.

Precision Calender with three superimposed and one offset roller. Flood lubrication.



The Hallmark

of DESIGN, SERVICE and PERFORMANCE *in* **RUBBER AND PLASTICS MACHINERY**

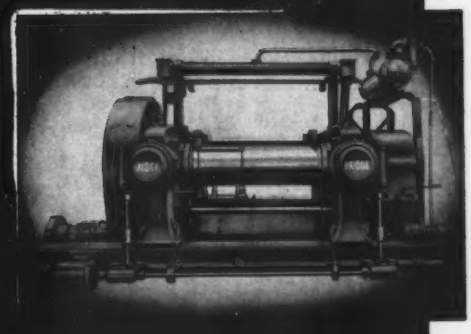


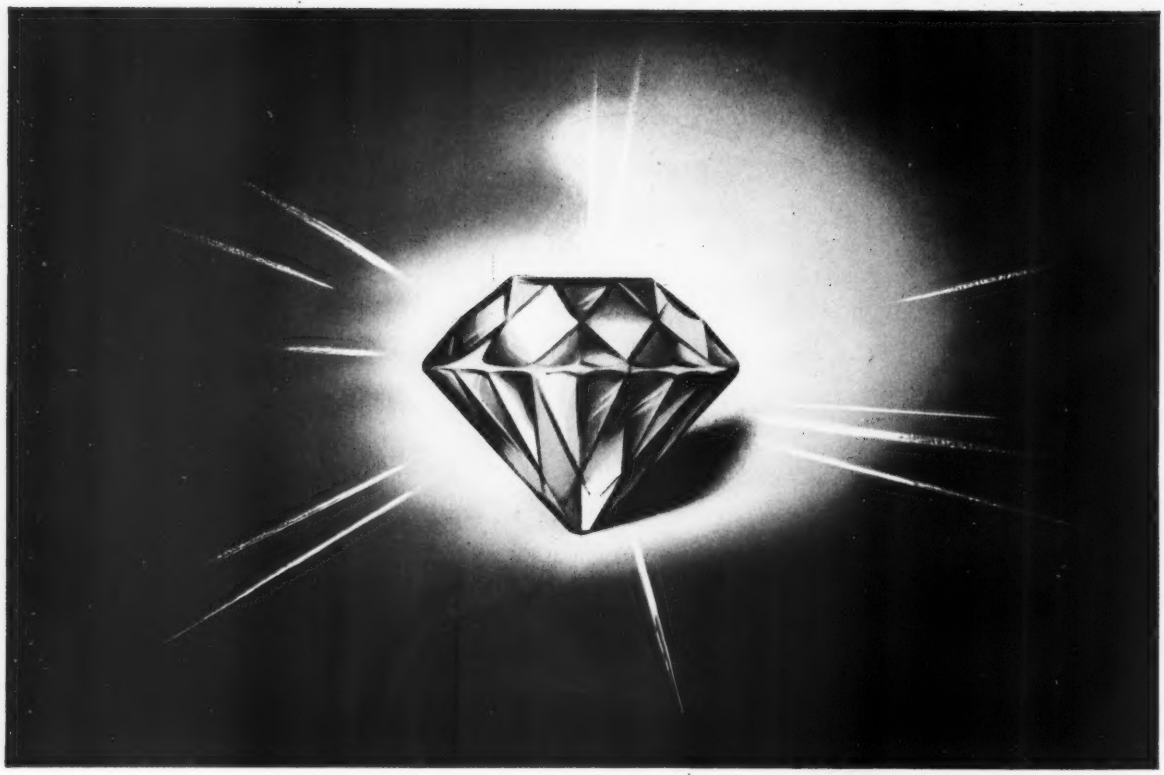
The Bridge — Banbury Patent Mixer. (1)

Precision Calender with four superimposed rollers. Flood lubrication. (2)

4½" Cold Feed Plastics Extruder. (3)

High temperature 22" x 60" Plastics Mill with flood lubrication. (4)





Colours that SELL

There is a correct selling colour for every manufactured article. Sometimes colour selection is fairly simple; but sometimes subtle hues and intricate tones are required, and the search for a shade that is 'just right' is far from easy.

That is why we recommend to you "WELLITE" CELLULOSE ACETATE MOULDING COMPOUND. It is produced in uniform, dust-free, cubical pellets under controlled conditions to ensure uniformity and in a standard range of well over 100 colours. Moreover, we guarantee to match exactly *any* particular shade you want.

Our colours are all tested for fastness and heat resistance and only the finest pigments and dyestuffs are used.

If you have a colour problem, don't hesitate to get in touch with us. The combined experience of our technical experts is at your disposal at all times.

Welwyn Plastics Ltd

WOODSIDE RD., WELWYN NORTH, HERTFORDSHIRE

Telephone : Welwyn **484**

A new material for seals and bearings

LACRINITE

TRADE MARK

Chief characteristics of "Lacrinite" are:—

(a) Low coefficient of friction.
(b) Self-lubrication.
(c) Cheapness in comparison to other materials used for similar purposes.

Already, "Lacrinite" is being used extensively as a sealing material in automotive engineering; it will have many other industrial applications such as the bearings illustrated, which are now undergoing test runs.

Comparative coefficients of friction:

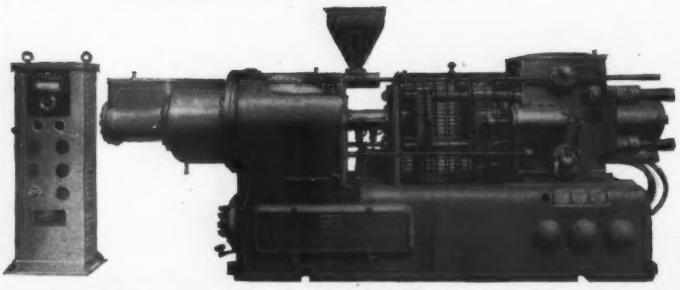
Bonded carbon - -	0.0754
Laminated fabric - -	0.0515
Lacrinite - - - -	**0.0157**

A LACRINOID PRODUCT

ETHER-WHEELCO
ELECTRONIC CONTROLS

for the automatic control of Injection Moulding Machine Nozzle Temperature

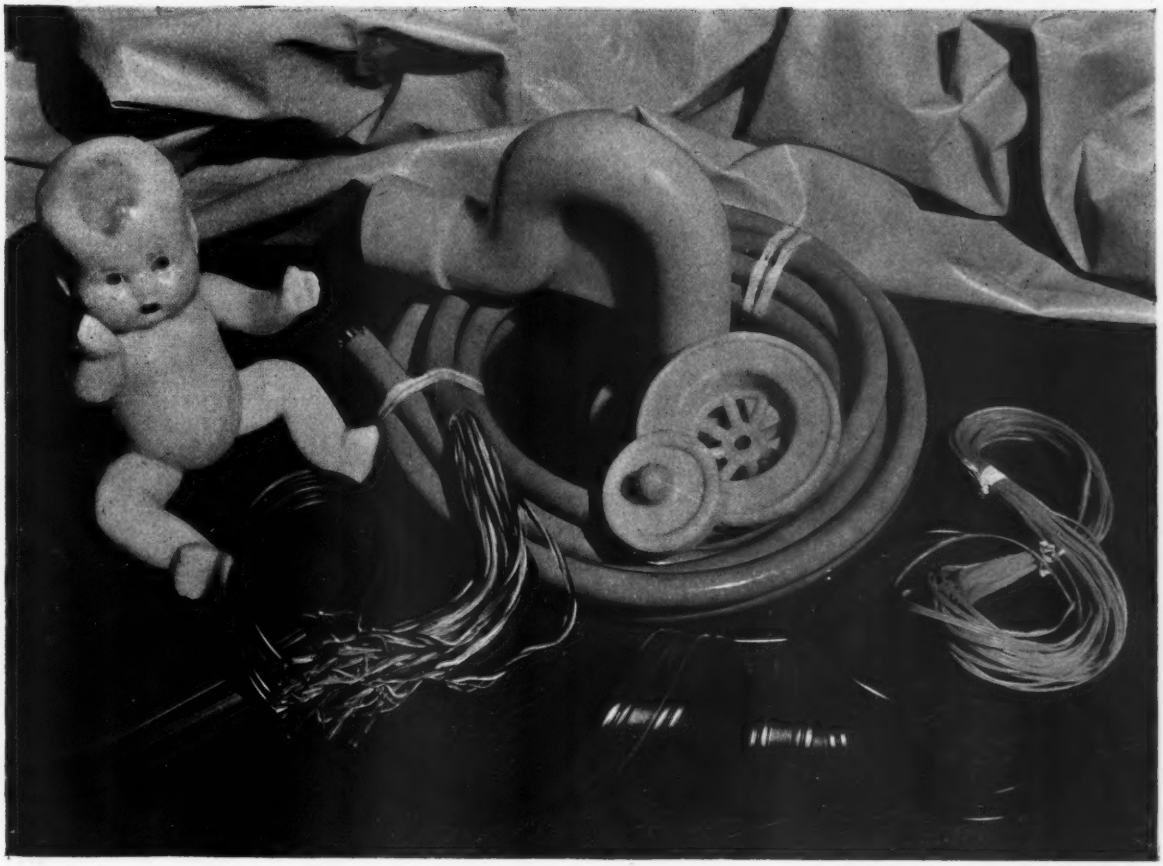
The Ether-Wheelco Type E.W.221 controls electrically heated nozzle temperatures with the greatest speed and accuracy possible with any such apparatus.
The use of Thermo-couples as the heat sensitive element enables the temperature of the actual surface of the nozzle used for curing the powder to be controlled.
Ether Controls can be fitted with switches and couples so that the temperature over the whole length of the nozzle can be measured, the control taking place where the powder is actually processed.
Many of the leading British and American Moulding machines are fitted exclusively with Ether Controls, including the E.M.B. machine shown herewith.
The E.W.221 "Capacitrol" is electronically operated and is reliable, moderate in price and has greater accuracy than the mechanically operated types.



The CAPACITROL E.W.221
Temperature Controller as shown gives the most rapid and accurate temperature control because it is electronically operated and acts with the speed of light.

SEND FOR LIST No. 250

ETHER LTD.
Tyburn Road, Erdington,
BIRMINGHAM, 24
TELEPHONE - - - - - - - EASt 0276-7



'WELVIC'

'Welvic' polyvinyl chloride compounds are available in a wide range of colours and grades—for calendering, extrusion or injection moulding. Special grades can be formulated to meet manufacturers' particular needs.
Under normal conditions, 'Welvic' products are resistant to water, salt solutions and most oxidising and reducing agents. These advantages, plus good electrical properties, make 'Welvic' specially suitable for cable insulation and sheathing as well as for a variety of extruded calendered and moulded products.

'Welvic' is the registered trade mark for the range of thermoplastic compounds based on polyvinyl chloride manufactured by Imperial Chemical Industries Limited.

IMPERIAL CHEMICAL INDUSTRIES LIMITED, LONDON, S.W.1 ICI

P.459

This streamlined diesel-electric train, one of nineteen built in Britain for Egypt, reveals the great strides made in modern transport. And even more rapid has been British progress in plastics—progress to which Derwent Plastics Ltd. have proudly contributed. Derwent's constant endeavour is to keep abreast of progress so that, when a modern moulding is needed, it's always best to . . .

let Derwent do it!

MINSTER MOULDINGS

DERWENT PLASTICS LTD., STAMFORD BRIDGE, YORKS. TELEPHONE : STAMFORD BRIDGE 294

'Celastoid'

TRADE MARK

CELLULOSE ACETATE

EXTRUSIONS

CAN BE USED IN MANY WAYS...

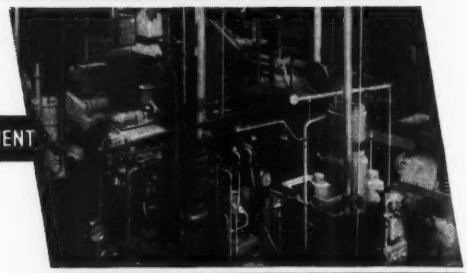
The illustration shows a variety of 'Celastoid' Extrusions produced experimentally and to special order. Can you see the possibility of using a tube or rod, or a special section, in your particular business? If you have an idea taking shape why not have a talk with our Technical Staff. Their experience and advice which is freely available, ought turn your idea into practical use. 'Celastoid' Extrusions are easily machined and fabricated, are proof against chipping and cracking, are washable, have colour-appeal and will polish to a permanent high gloss.

BRITISH CELANESE LIMITED

Plastics Division, Celanese House, Hanover Square, London, W.1.

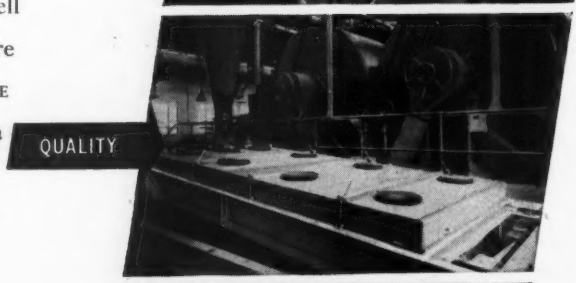
royds

P.36



What do you mean by Efficiency?

How much practical help can the moulding material manufacturer give the moulder in the solution of everyday production problems? Can he talk of moulds and methods on equal terms with a moulding man? Can he make departures from standard grades of material to meet the requirements of a particular job? More, will he be prepared to make special materials to meet a particularly exacting specification? These are typical practical points on which a moulder will tend to judge efficiency. These are points also on which Bakelite Limited are well content to be judged. First in the sphere of thermosetting plastics, BAKELITE experience extends over nearly half a century. The company's range of special-purpose materials is unmatched in the industry. And, behind all these aspects of technical service lie the research, development and testing by means of which the quality and consistency of BAKELITE materials are maintained.



BAKELITE PLASTICS

for Dependable Mouldings

BAKELITE LIMITED · 18 GROSVENOR GARDENS · SW1 · SLOane 9911

Plastics

DEALING WITH THE MANUFACTURE, USES AND POTENTIALITIES OF PLASTIC MATERIALS

PROPRIETORS: TEMPLE PRESS LIMITED

CHAIRMAN and MANAGING DIRECTOR: ROLAND E. DANGERFIELD

CONTENTS

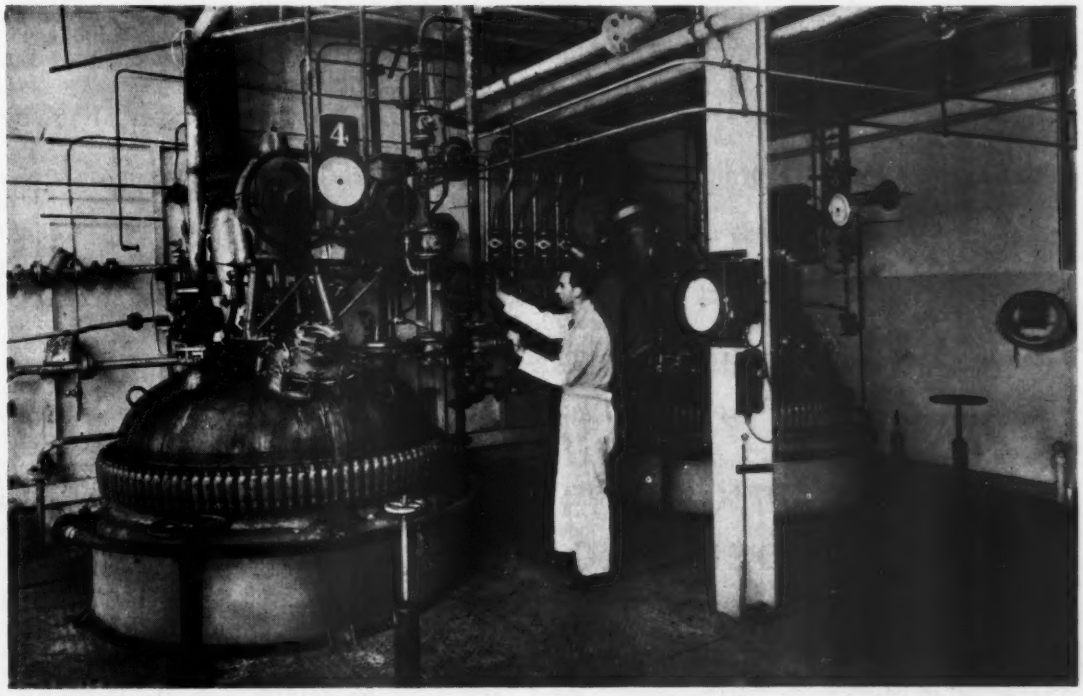
	Page
Editorials	219
Moulding Powder and Shot	220
Plastics for Railway Signalling Equipment	221
Letters to the Editor	223
P.V.C. Rigid Sandwich Board, by E. E. Halls	224
Rigid Thermoplastics for Chemical Plant	226
World's Industry Employs Plastics	229
Plastics in the Service of Man	230
Developments in Telephone Cables	232
Product Styling and Mould Design	234
Plastics in Building, by Joseph B. Singer	235
Production News	237
New Productions	238
The Daniels 125-ton Preforming Press	240
Education in Plastics Technology	242
Successful Designing for Plastics Moulding, by W. M. Halliday	243
Patent Review	246

EDITOR: M. D. CURWEN, B.Sc., A.R.I.C.

Published monthly in London, England.

Annual subscription rate 34/-. Shorter periods pro rata.

Part of the reactor room at the polystyrene plant of Styrene Products, Ltd., Manchester.



BM153

plastic mouldings that are FLEXIBLE

Amongst the more recent developments of plastic moulding is the production of flexible components from polyvinyl chloride (P.V.C.). Here is one of the two flexible nozzles made from this material for the well-known VACTRIC vacuum cleaner. Its resilience prevents any damage to furniture yet the nozzle is extremely tough and keeps its attractive appearance throughout a long life.

Our technical representatives, from London or Birmingham, are pleased to advise how plastic mouldings can best be applied to the needs of modern industry.

BRITISH MOULDED PLASTICS LTD
37 PORTMAN SQUARE • LONDON W1 *WELbeck 3934*

MOULDED PRODUCTS LTD
CHESTER ROAD • TYBURN • BIRMINGHAM 24 *Erdington 2201*

Sole Distributors for Scotland and N. Ireland:— CALEDONIAN PLASTICS LTD., 12 RENFIELD ST., GLASGOW, C.2

Plastics

VOL. XVI. No. 169 AUGUST, 1951

"I have frequently observed fungusses of this genus (Tramella) on old rails and on the ground to become a transparent jelly, after they had been frozen in autumnal mornings; which is a curious property, and distinguishes them from some other vegetable mucilage; for I have observed that the paste made by boiling wheat-flour in water ceases to be adhersive after having been frozen."

Philosophical Notes to "The Botanic Garden," Part II, by Erasmus Darwin, 1791.

EDITORIALS

Works Visit

FOLLOWING the rush and excitement of the exhibitions of the past three months, it was a pleasant relaxation to be invited to visit a few raw material factories, to observe some of the birth-places of the stream of raw moulding materials that feed our moulding plants.

On July 12, I.C.I. Plastics Division was "at home" to the Society of Chemical Industry and we were able to see the enormous range of pure and technical research that is being carried out at Welwyn—it is significant that so much stress is laid on the thermoplastic materials. More than ever is it borne on us that the greatest importance and urgency lies in solving the problems of properties and constitution—the relations between the size and shape or "layout" of the giant molecules we are manufacturing to the properties, physical and chemical, that they possess, and how these properties change with change of this layout or by adding new atoms to it. When such secrets are fully known and understood we shall indeed be able to tailor the molecule to our own desires and produce with greater precision new materials with the specific qualities desired by industry.

It is no wonder that work of this nature is almost entirely physical and no wonder that its direction bears greatly on the problems of electrical properties and on fibre-forming properties, avenues which certainly appear the most fruitful and the most propitious. It is astonishing to observe in this connection how during the past five or ten years these laboratories at Welwyn have changed from the predominantly chemical to the predominantly physical. On due thought it is not so astonishing—we know more about how to make big molecules than what they look like. Here, there is also a series of large technical laboratories fitted with every type of machine for obtaining moulding experience on all new experimental types of plastics—injection, extrusion, calendering, dipping, blowing and otherwise forming, machines that are also used for advisory purposes by demonstrating the most advanced methods to potential or existing customers.

The "high spot" of the day was the full-scale "experimental" plant for the production of Terylene fibre made from ethylene glycol and terephthalic acid and discovered in this country some six or seven years ago. The fibre is spun by the new melt-spinning process from the molten Terylene at high temperature and elongated to produce great strength in a manner similar to that of nylon spinning. It was a beautiful, thrilling and unique experience. There was also an exhibition of fabrics made from Terylene and filmy ladies'-wear, web-like curtain fabric and thick wool-like filter-blankets gave a foretaste of what the future holds for this remarkable synthetic material.

On July 18 we travelled down to Newport, Mon, to visit the new Monsanto factory that had grown up in the past three or four years. It was in 1927, long before the Newport works were dreamed of, that we first went to the Ruabon, N. Wales factory of Monsanto, to see the new pure phenol plant, the production of vanillin from oil of cloves from far-off Zanzibar, of benzoic acid and of aspirin. It was then considered a large works, but phthalic anhydride was not yet manufactured nor was the vast range of rubber chemicals, now being produced. Production of plasticse was in nobody's mind.

To-day at Newport a great and continually growing factory has sprung up. New detergents for a variety of industries ranging from laundering to textiles are made from petroleum and benzene in enormous quantities, as are new anti-oxidants, corrosion inhibitors and pour depressants for the lubricating oil industry. The "Arochlors" made by chlorination of diphenyl and similar chemicals find wide use as plasticizers of p.v.c. and in the film-coating industries.

Here, too, there was the "high-spot" of the day, for we had come chiefly to see the newest of the plants, the polystyrene factory. The basic raw material, the monomer styrene, will in a year or so be manufactured in bulk at the works of the associate company, Forth Chemicals, Ltd., at Grangemouth, near Edinburgh—now under rapid construction. When this is complete we shall possess one of the largest polystyrene plants in the country and no doubt one of the most modern constructions in the world. For the present the monomer is imported and polymerized and converted into moulding powder at Newport. Here we saw the mixing and colour blending processes and the feeding of the mixture to a battery of large "Erie" machines, each of which extrudes at a high rate a continuous stream of some dozen or more ⅛-in. "rods," which are cooled in a stream of water and finally cut into the small pellets used as moulding powder.

Of special interest, too, was the modern colour-matching section so unlike the older so-called colour-matching methods that have existed since time immemorial. There is no dependence on the eye at all—all colours are accurately analysed into their respective wave-lengths by physical instruments and reported as graphs. Such graphs ensure that a customer's requirements can be supplied and continued exactly on any future occasion; the hit-and-miss methods of "experts" who work by vision is a thing of the past.

On the day of going to press with this issue of "Plastics," we travelled down to Barry, also in South Wales, to see a third great plastics raw material factory, that of British Geon, Ltd., completed only a few years ago and producing a wide

range of co-polymers of vinyl chloride and vinylidene chloride in many forms.

The description we must leave until our next issue, but we should like to remind our readers of the importance of them all, for in these three factories and in the others that are now under construction we see the culmination of our desires in the chemical field over the past 25 years, the growth of chemical and plastics production from two different raw materials side by side, from coal and from petroleum.

Production in 195X

IN another year or two the proposed expansions in plastic raw material manufacture calculated by the British Plastics Federation and laid down in the Association of British Chemical Manufacturers' memorandum to the Ministry of Supply in 1949 will be completed, and we hope that the figure of 185,000 tons of all types proposed in it will be reached without trouble.

It cannot but strike readers most forcibly that the figures for the expansion were estimated solely for peace-time production, yet we have before us a re-armament programme that will consume plastics at a rate vastly greater than that which existed at the end of the last war. We shall probably find that 185,000 tons is far from adequate, so we hope that the Ministries are being realistic about it.

Recent visits to moulders and fabricators show that the spate of important technical ideas under development is increasing rapidly.

MOULDING POWDER AND SHOT

It is not always necessary to apply the "informative labelling" programme to sell our materials. Sometimes it is done quite satisfactorily by the customer. A recent issue of "Edinburgh Evening News" tells us that to satisfy themselves that a new type of corrugated sheet was "strong and not too brittle," the members of the Water Committee of Edinburgh Town Council, to-day submitted a sample to test. Councillor William Drummond threw the plastic with some force onto the floor and, when it stopped bouncing, Councillor R. E. Douglas jumped on it several times. The sample, having withstood Mr. Douglas's 12-13-stone weight, Baillie G. Romanes commented: "I like the look of the stuff. It seems very strong and durable." I'm not quite sure whether the corrugated sheet was made of bouncing silicone or not, but it is very obvious that there should always be a 12-13-stone councillor on tap in every Town Council.

Specification for Councillor

* * *

Many years ago, when bombs and aerial mines were attracting policemen from their lawful occasions and dragging the Home Guard and Civil Defence wardens from their evening game of "pontoon," this journal published a funny cartoon scarifying authority for denying the value of plastic helmets against falling brickbats and the noses of our own shells that dropped like hail from the heavens. Accordingly, the aforesaid p.cs., H.G., and C.D.ws., had to put up with an additional pound or so on their heads for the whole of the war period; this in spite of the fact that the phenolic helmet had already proved of immense value to the coal miner below ground. Authority has changed its mind since and we have already published a note regarding the fire-helmet manufactured by Moulded Plastics, Ltd., of Birmingham, to Home Office specifications. One such helmet has already been put to a very severe practical test and has emerged with full honours. While responding to a fire call, Fireman Harry Miller, of the Kent Fire Brigade, was thrown from a machine travelling at 30 to 40 m.p.h., directly on to his head. Although the shell of his helmet was split, it protected his head from injury and the shock-resistant head-harness undoubtedly saved his neck from being broken. His only injury was a sprained ankle and, as the photograph shows, he is none the worse for the accident. No doubt the helmet will grace Mr. Miller's mantlepiece in future.

Mind Your Head!

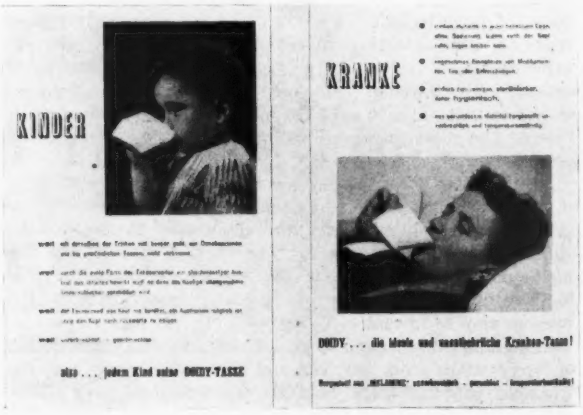
Fireman Miller and the helmet that saved his life.

* * *

My note last month on the preference by certain British manufacturers for individual propaganda of plastic goods by the use of trade marks and individual direct collaboration with buyers and public, as opposed to collective effort and collective quality marks as typified by the Danish and Australian plastics industry, has brought me a letter from Mr. J. G. Selby, of Insulators, Ltd., who mould the now famous "Doidy" cup for their clients, Martin Russell, Ltd. The latter company export the cup to many foreign countries and has instituted its own method of "informative labelling." I have before me two of its pamphlets in French and in German which have had very successful results. In addition to describing the use and value of this uniquely shaped cup, there is added an adequate description of its properties and the methods by which it should and should not be treated to ensure long life. From the strength point of view, it is as truly "unbreakable" as makes no matter, and the high heat and water resistance of melamine makes it very acceptable to the housewife.

DOGSBODDY.

Informative Labelling



(*Photo: Courtesy of British Railways*)

Fig. 1.—Interior of Agecroft Junction signal box, showing plastic illuminated track diagram mounted above the levers.

Plastics for Railway Signalling Equipment

THE recently installed signal box at Agecroft Junction on the Manchester-Bolton line of British Railways—London Midland Region—incorporates some of the most recent techniques and the most modern equipment available to railway signalling engineers. Many of the improvements are directly due to research and development carried out by the region's Signal and Telecommunications Engineer's department under the direction of Mr. S. Williams. This department has for some time taken an interest in the properties and potential applications of plastic materials and therefore many plastic materials have been incorporated in the equipment of the new box.

Illuminated Track Diagram

The tracks, points, signals, etc., which are in the area controlled by the signal box are indicated on an illuminated diagram (Fig. 3) which is suspended above the controlling levers and instruments. Before the use of plastics this was painted on a wooden board. To prepare the diagram it was necessary to spray a well-seasoned board with several layers of cellulose lacquer. With the aid of a full-scale print, impressions of the track layout were then indented by hand and taking these marks as guides the diagram was then hand-painted. This was a long and laborious process and the average time taken for completion of a diagram was about 3 weeks. Such diagrams must be amended according to any changes in track layout or signals. With the cellulose-base diagrams this is a difficult process as all previous marks have to be over-painted and recellulosed.

The diagrams actually used at Agecroft, as well as at Euston and many other locations in the Region, make use of white "nylon finish" vinyl chloride/vinylidene chloride copolymer sheeting, 20 thou. thickness, supplied by BX Plastics, Ltd. The chart is printed from the original master diagram by a true-to-scale process. In this process, gelatine containing a bichromate is melted and sprayed on to a plate called a "jelly table." A print negative on ferroprussiate blue-print paper is laid dry on to the jelly with even pressure. When the print is stripped off an etched impression of the drawing is left on the jelly. When treated with an inked roller, only the etched portions retain ink and the copolymer sheet may be printed directly from the inked plate. Coloured portions are afterwards filled in by hand; alterations in the diagrams are easily effected by scraping off the previous marking and inking in the new layout.

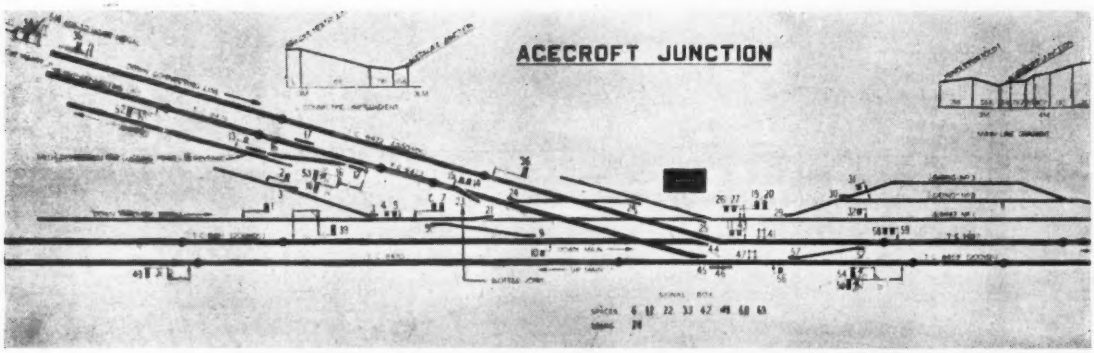
The copolymer sheet is mounted on solid half-inch board. It may be easily cleaned, merely by wiping with a damp cloth.

One of the major development problems connected with this process was the search for a suitable adhesive for mounting the copolymer sheet on to the board. After many trials a special adhesive was produced by Design Adhesives, 9, West India Dock Road, London, E.14. It is applied by treating the sheet and the board separately and pressing these together with a heavy roller.

The main function of the illuminated diagram is to indicate by small red lights which "track circuits" are occupied.

Standard post-office type lamp holders and bulbs are used; a hole being drilled in the board to accommodate them. The actual lamps are covered with red mushroom-shaped caps (see

Fig. 2.—P.V.C. lamp-caps for illuminated track diagram.



(*Photo: Courtesy of British Railways*)

Fig. 3.—Track diagram showing tracks, points, signals, etc. P.V.C. lamp caps are seen as black dots.

Fig. 2) manufactured by Hellermann Electric, Ltd., Tinsley Lane, Crawley, Sussex, from translucent flexible polyvinyl chloride. The domed tops of these caps, which slide directly on to the bulb, project slightly from the surface of the diagram and when the bulb is alight the red light can be seen clearly from any angle.

Lever Handle Covers

In addition to these two uses on the track diagram, plastics are employed for several other functions in the signal box. The handles of the signal levers, for instance, which in older boxes were of bare metal, are at Agecroft provided with white plastic covers. These are made from "Celastoid" cellulose acetate extruded tubes (British Celanese, Ltd.) which are fitted by softening in a solvent mixture of water, acetone and methylated spirit, after which they are stretched over the lever handle. An end-cap for each handle cover is cut from "Celastoid" sheet and cemented to the top of the tube.

Further experimental work is now in progress for examining the use of a one-piece handle cover in white p.v.c., which appears to have advantages in the ease of fitting.

(*Photo: Courtesy of British Railways*)

Fig. 4.—Signal levers, showing white "Celastoid" handle covers, and lever pull plates moulded in phenolic material and subsequently sprayed.

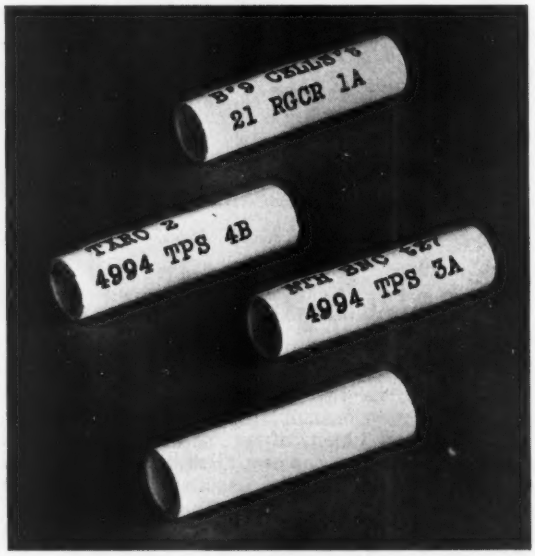


Fig. 5.—Extruded "Celastoid" terminal sleeves for electrical conductors, showing cold-indented markings.

Fig. 6.—Lever name plate, engraved on "Traffolyte" resin-bonded paper laminate.

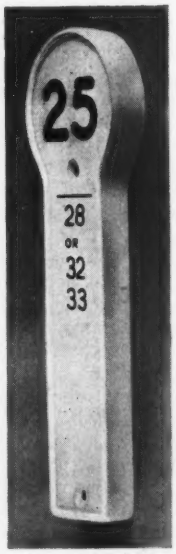


Fig. 7.—Sprayed and engraved lever pull plate moulding.

All wires used in connection with electrical signalling circuits are fitted with identification sleeves adjacent to the terminal at either end. These sleeves are cut from "Celastoid" tubing similar to that used for the handle covers. Each terminal has a specific identification and this is cold-indented by a specially designed Addressograph machine. The sleeves and the types of marking are seen in Fig. 5.

Various plastics are also used in different situations to provide instruction or identification plates.

Ground frames are small unattended lever frames which permit the use of a remote siding under the absolute control of a signal box and they are operated by the guard of the train using the siding. The ground frame is fitted with a plate carrying operating instructions. These notices are uncovered and must be weather-resistant. This is achieved by printing on the reverse of a ¼-in. "Perspex" sheet and backing with white cellulose lacquer to provide contrast and protection for the printing.

The lever pull plates attached to the front of the signal lever (Figs. 4 and 7) giving number details, are basically produced from standard black phenolic mouldings. The front of the moulding is sprayed with a white lacquer and stoved. The required letters and numbers are then engraved through the white coating revealing the black base material in contrast.

Yet another production method is used to make the lever name plates (Fig. 6) which identify the levers. The basic material here is white-black-white "Traffolyte" (Thos. De La Rue and Co. Ltd.) plastics sandwich laminate. Here the white top ply is cut away to leave the letters and numbers clearly engraved in black.

Other uses of plastics materials which cannot be mentioned separately in detail, include such components as moulded instrument cases, electrical insulating materials, etc. Green embossed p.v.c. sheeting is used decoratively to cover the front of the instrument shelf in the signal box.

The use of plastics extends beyond the signal box to the actual running lines. "Permali" densified resin-impregnated wood laminates made by Permali, Ltd., Bristol Road, Gloucester, which is already a standard material for insulated fish-plates, is also used for the electrical insulation of point rodding and point connections on track-circuited lines.

A further application of plastics, which is, however, still in the experimental stage, relates to the "spectacles" on signal arms. These are the red and green glass discs which, illuminated from behind, show the signals at night. The discs are mounted in the metal signal arms by normal glazing techniques, using putty. As it is essential to replace a broken "spectacle" immediately, this must often be done at night by the "S. and T." lineman on duty. The "spectacles" now under test are edged with an extruded p.v.c. channel providing a flexible frame which is easily fixed to the signal arm by metal clips, thus obviating the laborious glazing process.

We wish to thank Mr. S. Williams and Mr. A. L. Mills of the London and Midland Region's Signal and Telecommunications Department for providing the facilities which have enabled us to describe these developments in the use of plastics in railway signalling.

LETTERS TO THE EDITOR

Correspondents are reminded that a stamped and addressed envelope should be enclosed in all cases where a personal answer is desired. It is understood that any letter received may be published at the discretion of the Editor.

Road Marking

Sir,—Can you supply us with information regarding the plastic white-line compositions used in marking roads to control traffic?

G.K.S.

Manchester.

[EDITOR'S NOTE: There are two distinct types: (1) A simple resin/pigment/aggregate composition, the specification for which was laid down in 1941 and is regarded as the normal official type. (2) A polyvinyl chloride type made in short lengths by moulding. The first type is composed of the binder resin (phenolic type, or colophony, etc.) 14-18 per cent., crude wool grease 3.5-4.5 per cent., or light mineral oil, filler (titanium oxide or lithopone and silica) to a total of 17.5 to 23 per cent., and fine sand aggregate 65-55 per cent. The mixture is applied hot to the road surface. The second type, which we understand is still under test, has already been described in "Plastics," March, 1950, page 79.]

Domestic Ware

Sir,—Could you, please, give us some names and addresses of firms that make plastic cups and saucers?

MODERN FISH CATERERS (WEMBLEY), LTD.

4, Sunleigh Parade,
Wembley, Middlesex.

Continuous Measurement of Plastic-Covered Wire

Sir,—An article in "Plastics," May, 1951, page 150, mentioned the use of an electronic micrometer developed by the Electronics Section of the National Physical Laboratory for above purpose. We would like to have further details of its construction and name of supplier, if the instrument is available as a ready-made unit.

DELTON CABLE CO.

1400 Pahari Imli,
Jumma Masid,
P.O. Box 1179, Delhi.

[EDITOR'S NOTE: We understand that an instrument will shortly be in production; meanwhile, further information is obtainable by writing to the Electronics Division, National Physical Laboratory, Teddington.]

Plastic Tubing

Sir,—We are interested to purchase plastic tubing of the kind that may be manipulated under heat, particularly by blowing. Would you please put us in touch with any likely makers, bearing in mind that the cheapest type of plastic would probably be acceptable.

THE ENGLISH GLASS CO., LTD.

Empire Road,
Leicester.

Cellulose Acetate Fabrication

Sir,—We are manufacturing vision packings from cellulose acetate sheets and are interested in mechanizing the manufacture. Can you give us names and addresses of suppliers of apparatus or machines suitable for the above purpose?

Moreover, we are interested in the deep-drawing of cellulose acetate sheets, and we wonder whether you could also give us addresses of suppliers of this kind of machinery.

PLASTIC PACKING N.V.i.o.

Amsterdam.

Plastic Discs

Sir,—We are anxious to obtain supplies of plastic discs as sample enclosed, and we are wondering whether you are able to put us in touch with a manufacturer who will give a satisfactory delivery.

DICK'S ASBESTOS CO., LTD.

5, Copthall Buildings,
Copthall Avenue, E.C.2.

[EDITOR'S NOTE: The sample, in the absence of proper analysis, appears to be made of one of the elastomers, such as "Hycar." We suggest that you get in touch with I.C.I., Ltd., Plastics Division, Black Fan Road, Welwyn Garden City, Herts, and with British Geon, Ltd., 21, St. James's Square, London, S.W.1, who manufacture co-polymers of the vinyl chloride and vinylidene chloride type.]

Cold Setting Plastics

Sir,—Would you kindly inform me where I could obtain some general information about flexible moulding and cold-setting plastics.

J. A. BUTLER.

50, Park Street,
Bridgend, Glam.

[EDITOR'S NOTE: I.C.I., Ltd., Plastics Division, Black Fan Road, Welwyn Garden City, Herts, issue technical pamphlets dealing with both of these subjects. Scott Bader and Co., Ltd., 109, Kingsway, London, W.C.2, have also a considerable amount of data on cold-setting resins.]

P.V.C. Rigid Sandwich Board

By E. E. HALLS

RIGID p.v.c. is polyvinyl chloride containing the usual lubricant and stabilizer, the former to assist fabrication of the thermoplastic powder through milling and sheeting operations, and the latter to prevent or offset degradation upon service exposure, particularly to heat. It contains little or no plasticizer and, in consequence, it has not that limpness and flexibility possessed by the usual plasticized product, but its rigidity is combined with a quality of toughness and resistance to impact shocks that is inherent from the elastomeric properties of the basic thermoplastic resin. The material can be fabricated through the normal processes of engineering, i.e., cutting, sawing, milling, drilling, tapping, engraving, etc. This, in combination with good mechanical and electrical properties and high qualities of chemical resistance, opens up a wide field of fruitful applications.

It is only within recent years that this material has become available in Britain, although somewhat similar material was imported before the war; the imported material contained some plasticizer and by no means possessed the dimensional stability of the present British-made product under conditions of heat and dampness.

A new form of rigid p.v.c. sheet produced in this country is a "laminated" form, i.e., sheet having a central layer or core of colour contrasting with that of the surface. For example, the core may be white, the surfaces black, or vice versa. This material exhibits all the meritorious qualities of rigid p.v.c., not only with respect to mechanical, electrical and chemical properties, but also permanence of shape and dimensions under quite a variety of exposure conditions. In conjunction with these attributes, it offers the facility of surface patterning by conventional engraving methods, thus giving clean-cut, neat and clear results by a simple, single process.

Multilayer material, or "sandwich board" as it is usually termed, is not new. The board extensively used in the past is a thermosetting paper-base laminated-sheet product. This is prepared from sheets of paper, impregnated with synthetic resin, built up to the required thickness, and bonded together to a rigid board under heat and pressure. The resin may be urea base or phenolic, or the sheet may be built up from a combination of papers, using both of them. The urea resins are employed for pale colours and pastel shades and the phenolics for brown and black. Thus a black-white-black combination would utilize urea resin for the white core papers and phenolic resin for the outer black layers. The reverse, of course, would hold good for a white-black-white sandwich material, whilst a blue-white-blue material, for example, would employ the urea resin throughout.

In this thermosetting-type of sandwich board a very wide range of colour combinations is possible, and sheets having more than three layers are also practicable.

The material is an excellent one and is extensively used with considerable satisfaction. It does, however, possess shortcomings (as do all raw materials), so that the new p.v.c. sandwich board is a welcome complement to it. One drawback is linked with the relatively high water absorption value of urea-resin laminates, and a resultant "breathing" effect as atmospheric conditions change, this being most noticeable from a warm, dry to a cool, wet state. This may cause warping, particularly if the component concerned is rigidly fixed at the corners, as by eyeletting. The effect is augmented by any lack of symmetry about the centre plane. This inequality can be caused by the engraving in the face side, but is accentuated by lack of precise equality of thickness of the two face layers. Again, the effect of moisture and warmth may ultimately cause blistering, especially if the fluctuations in exposure conditions are severe.

In contrast with the resin-bonded paper-base laminated board, the p.v.c. material is thermoplastic. This immediately imposes an upper temperature limitation upon it, and 70 degrees C. is considered to be the maximum, unless it is mounted under compression, in which case a lower limit must be determined in relation to the pressure and amount of plastic flow that occurs. A second feature that must not be ignored is dimensional movement that results from release of stresses set up in the material during its initial production. These depend solely upon the fabrication conditions of rolling and calendering, extrusion, etc., with particular relation to temperature conditions. Their release is determined by their own nature and that of the exposure conditions, and this property is one that can only be assessed by the testing of material representing a particular technique of manufacture. If appreciable plasticizer is included in the composition, other dimensional change effects may super-impose themselves, dependent upon the tendency of this plasticizer to be expelled by warmth or moisture.

Table 1 deals with this type of p.v.c. sheet when immersed in distilled water at room temperature continuously for three months. The increase in weight is small, and the general effect upon dimensions is towards retraction, the total change being small enough to ignore.

Table 2 refers to the same material exposed to continuous

Table 1.—Dimensional Stability of Rigid P.V.C. Sandwich Board Under Extended Water Immersion at 20° C.

Thickness of board (inches)	Period of test (days)	Total change in dimensions (parts per 1,000)			Total change in weight (per cent.)
		Length	Width	Thickness	
1/16	1	−1	none	−2	+0.08
	7	−1	none	−2	+0.11
	30	−1	none	−1	+0.17
	100	−1	+3	none	+0.28
1/8	1	negligible	−2	−2	+0.11
	7	negligible	−2	−1	+0.16
	30	−0.5	−1	−1	+0.23
	100	+0.5	+2	+2	+0.31

Table 2.—Dimensional Stability of Rigid P.V.C. Sandwich Board Under Extended Dry Heat Conditions at 60°C.

Thickness of board (inches)	Period of test (days)	Total change in dimensions (parts per 1,000)			Total change in weight (per cent.)
		Length	Width	Thickness	
1/16	1	−1	−5	negligible	−0.05
	7	−3	−8	negligible	−0.10
	30	−5	−10	negligible	−0.13
	100	−15	−18	+20	−0.27
1/8	1	negligible	−2	negligible	−0.11
	7	negligible	−4	−2	−0.15
	30	negligible	−6	negligible	−0.19
	100	−8	−20	+20	−0.33

Table 3.—Dimensional Stability of Rigid P.V.C. Sandwich Board Under Fluctuating Conditions of Warmth and Humidity

Thickness of board (inches)	Period of test (days)	Total change in dimensions (parts per 1,000)			Total change in weight (per cent.)
		Length	Width	Thickness	
1/16	1	negligible	negligible	—1	+0.05
	7	negligible	negligible	—1	+0.09
	30	negligible	−1	—1	+0.15
	100	negligible	+1	—0.5	+0.25
1/8	1	negligible	negligible	—2	+0.12
	7	negligible	negligible	—2	+0.21
	30	negligible	+2	—4	+0.33
	100	+2	+4	—4	+0.37

TABLE 4.—Results of Heat Test, Water Immersion, and Dry and Wet Heat Cycles on $\frac{1}{8}$ in. P.V.C. Laminated Sheet.

Test conditions	Black faced, white core, $\frac{1}{8}$ in. thick			White faced, black core, $\frac{1}{8}$ in. thick		
	Total change in dimensions, (parts per 1,000)		Total change in weight (per cent.)	Total change in dimensions, (parts per 1,000)		Total change in weight (per cent.)
	Length	Width		Length	Width	
Dry heat test (6 hours at 60°C)	—	—	−0.09	—	—	−0.04
Water immersion, 24 hours at 20°C.	—	—	+0.12	—	—	+0.10
Cyclic test :—						
(a) 16 hours dry heat at 70°C.	None	None	−0.11	None	None	−0.08
(b) 16 hours wet heat of 100% humidity at 70°C., cooling off in the cabinet	None	None	+0.15	None	None	+0.10
(c) As (b)	−10	−10	+0.26	None	None	+0.19
(d) As (b)	−10	−10	+0.15	−10	−10	+0.24

dryness at 60 degrees C. for three months. The loss in weight—to be anticipated—is of small magnitude, but the effect on dimensions is towards a shrinkage in area and increase in thickness. The ultimate total change is appreciable and not sufficient to be troublesome in most applications.

Table 3 covers conditions combining the two influences, i.e., 55-60 degrees C. temperature with humidity 70-75 per cent., 20 degrees C. night temperature with humidity rise of 100 per cent. An absorption shown by the small regular weight increase occurs, but dimensional movement may be neglected.

Table 4 shows a more severe wet-heat condition of 100 per cent. humidity at 70 degrees C. after a preliminary drying at the same temperature. A small weight increase with a rather larger change in area results, although the latter is only of the order of 1 per cent. in each direction.

Table 5 depicts a continuance of this severe hot-wet condition on a different thickness of sheet, and the results indicate that although the weight change gradually increases to a stable figure of about 1 per cent., the area change tends to stabilize itself in the first few days and does not tend to increase progressively. The samples were freely positioned in the test cabinet and showed a very slight tendency to buckle after 20 days, this not becoming accentuated during the remainder of the test.

The performance of the material during all these tests is assessed as very good indeed, dry-heat conditions having the most adverse influence, and even this not beyond a tolerable degree.

An ideal application for this material is for what can be designated conveniently " name plates " on apparatus and equipment. It can be blanked and pierced, sawn or milled, and drilled readily without any signs of splitting, checking or cracking. It can be engraved readily, using Vee or parallel cutters; the normal carbon steel types are satisfactory, although the high-speed steel-alloy grades may be employed. A gentle air blast, pin-pointed on the tool point, is useful for cooling as well as for blowing away the swarf.

The material may be used for supplier's name, trade mark, and serial number of the equipment, as well as for instruction cards, warning notices, labelling of electrical connections, etc. It possesses a very dense surface, so that it does not " grime " with dirt, and is resistant to solvents and oils. It also has appreciable chemical resistance.

Inertness to many chemicals makes the material eminently suitable for labelling not only electrical machines in the electro-plating shop, but also the vats comprising the plating equipment itself. It contributes to " permanent " marking,

Table 5.—Effect of Hot Wet Test Exposure on 1/16 in. P.V.C. Laminated Sheet.

Period of test (days)	White faced, black core			Black faced, white core		
	Total change in dimensions, (parts per 1,000)		Total increase in weight (per cent.)	Total change in dimensions, (parts per 1,000)		Total increase in weight (per cent.)
	Length	Width		Length	Width	
3	None	None	0.30	−10	−13	0.35
6	−10	None	0.45	−10	−13	0.55
10	None	None	0.70	−10	−25	0.70
15	−20	None	0.70	−10	−25	0.85
20	−20	None	0.70	−10	−13	0.88
30	−10	None	0.75	−10	−13	0.95
40	None	None	0.80	−10	−13	1.00

because the engraved characters cannot be erased, and the material itself is unaffected by most of the chemicals concerned and can be cleaned free from reagents splashed upon it by swabbing with water. Broadly, it is unaffected over long periods by solutions of ammonia and ammonium salts; chromic acid up to concentrations of about 50 per cent.; sulphuric acid up to concentrations of about 90 per cent.; nitric acid up to concentrations of about 50 per cent.; hydrochloric acid; hydrofluoric acid 40 per cent. (at room temperature only); phosphoric acid; and, generally, solutions of metal-plating salts.

In general, except where otherwise indicated, the above holds good for temperatures up to the limiting working temperature of the material (60 to 70 degrees C.). Naturally, in important applications the user should confirm the performance of the material in the solutions concerned under working conditions.

In these applications, the method of fixing the material has to be considered in conjunction with the nature of the chemicals involved. Screws of stainless steel, monel metal, aluminium alloy, or even of rigid p.v.c. itself or other plastic, such as moulded or laminated phenolic-resin rod, are the most obvious choice for most of the ordinary applications. Sticking with special p.v.c. cements is a practical possibility.

From the foregoing, the sandwich-board form of rigid p.v.c. sheet fulfils a specialized application, but in wide fields, justified by the high quality of this material in the mechanical, electrical and chemical senses. The material has been shown to be dimensionally stable and may therefore be regarded as " permanent " in these applications.

The few uses quoted above are typical, but not limiting, because its properties enable it to give good service both indoors and outdoors. Factory and office notices in general may be catered for, as well as their counterparts in buildings and public places of all descriptions. Excellent resistance to water and to moisture absorption, freedom from tendencies to mould growth or fungi degradation, make this possible.

Submarine Water-gauges

Details of the testing of " Plexiglas " tubes in the water gauges of flooding tanks in submarines and in depth gauges at static and at impact stresses set up by internal pressure, such as may be occasioned by depth charges, comprise part of a report, dated December, 1943, from the materials testing station of Fried. Krupp Germania-werft A.G., Kielgaarden, which can be consulted at the Technical Information and Documents Unit of the Board of Trade, Lacon House, Theobalds Road, London, W.C.1. (Ref. F.D. 1013/50.) It was ascertained that, contrary to metallic materials, the tubes were destroyed at approximately the same pressures at both impact and static stresses. The superiority of " Plexiglas " tubes over conventional glass water-gauge tubes was clearly demonstrated, but so was also the sensitivity of the former to surface damage. It was observed that a scratch on a " Plexiglas " tube reduced the strength by about 50 per cent. at impact stress.

Rigid Thermoplastics for Chemical Plant

By Prof. K. KREKELER *

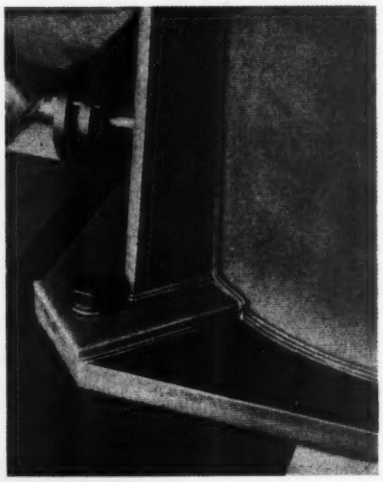
DURING recent years, large chemical apparatus, including the necessary fittings, pumps and ventilators, have been produced to an increasing extent entirely of thermoplastics. The construction of such plants must be planned and designed under consideration of the special properties of thermoplastics. As in the case of metal, the basic units of construction are sheets, plates, tubes, profiles, etc.

As an example, Fig. 1 shows an absorption plant for nitrous gases. The plant is for the passage of 12,420 cubic ft./hr. at acid concentrations of 40 per cent. and it is entirely made of polyvinyl chloride ("Trovidur"). The towers have a diameter of 20 ins. and are 15 ft. high. Some details of the welding construction may be discussed first, as they are of special interest from the point of view of design and production. Fig. 2 (an enlarged view of position 1, Fig. 1) shows the joining of longitudinal and peripheral seams of one of the three towers. One recognizes clearly the four welding beads of the top layer. As will be shown later, the p.v.c. plates are prepared for welding exactly in the same way as steel plates, i.e., the bevelling, the edge distance as well as the diameter of the welding rods to be used must be determined in advance together with the number of layers. The typical appearance of the welding bead is due to the fact that in the welding of plastics no fluidity of the material is caused. The bonding takes place under pressure in the plastic condition, whereby the welding rod does not completely disappear in the welded seam.

Fig. 3 (which is a close-up of position 2, Fig. 1) shows the baseplate of the tower and the welded-on gusset plate. Only the screws are steel, as screws of plastics cannot generally be recommended due to their high notch sensitivity. If in special cases screws or stud bolts have to be made of plastics the use of a rounded thread (e.g., according to the German Standard DIN 405) is to be recommended. In this instance, instead of hexagonal nuts, nuts with knurled heads should be chosen. These cannot be tightened with the usual spanners and thus avoid high tightening forces.

Fig. 4 (position 3, Fig. 1) shows the suction pipe leading to the ventilator and demonstrates similarity of treatment to metal construction. The construction shows great cleanliness and accuracy in its execution.

The drip-water separator built into the absorption plant may be treated as an example of the production planning required for the execution of such a



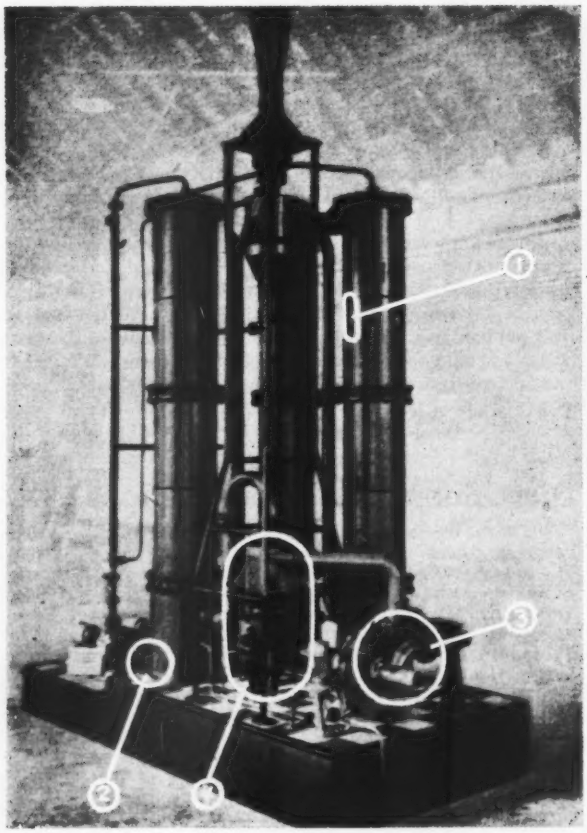


Fig. 1 (left.)—Plant for the absorption of nitrous gases, fabricated entirely in rigid p.v.c. ("Trovidur.") Height of tower 15 ft., diameter 20 ins.

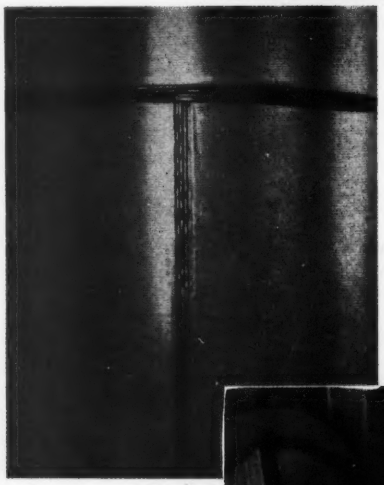


Fig. 3 (above).—Baseplate of tower with strengthening plate and rib. (See Fig. 1, position 2.)

Fig. 2 (left.)—Longitudinal and peripheral seams of tower. (See Fig. 1, position 1.)

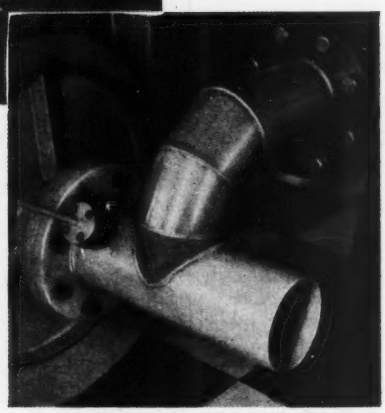


Fig. 4 (above).—Inlet pipe to ventilator. (See Fig. 1, position 3.)

* Translated from "Werkstattstechnik und Werksleiter," Vol. 40, November, 1950, by permission of the author and the editor.

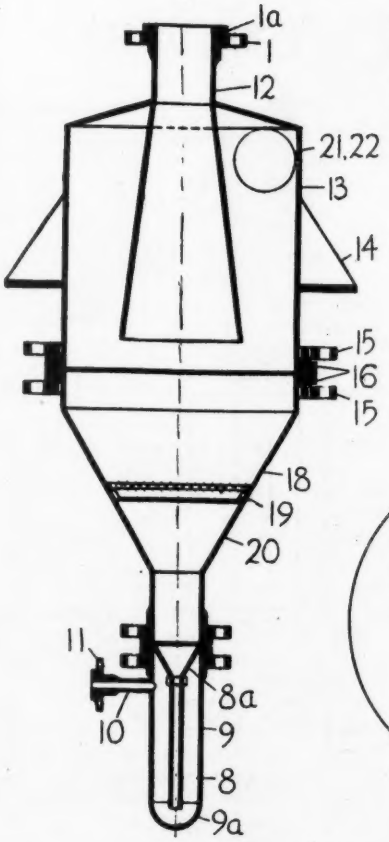
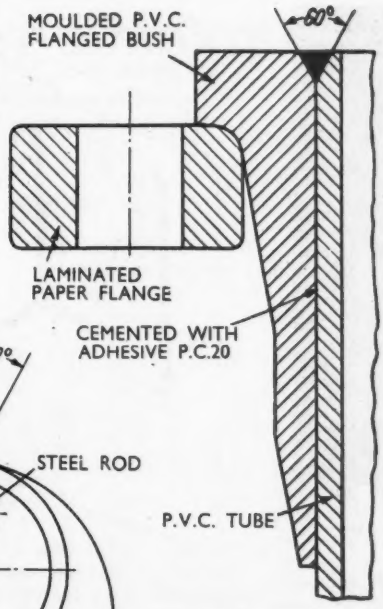


Fig. 5.—Drip-water separator for absorption plant: section showing details of construction.

Fig. 6 (right)—Pipe end with cemented and welded bush and flange of laminated hard paper ("Trolitax.")



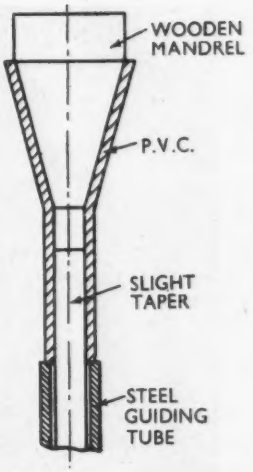


Fig. 7 (above)—Shaping of a conical tube.

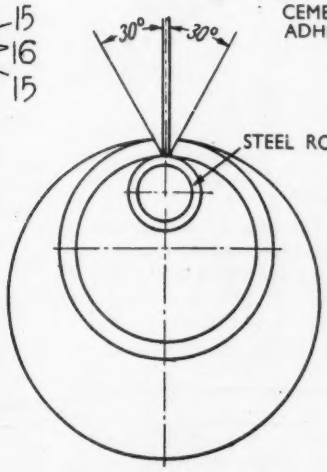


Fig. 8 (above) — Welding fixture for conical cover.

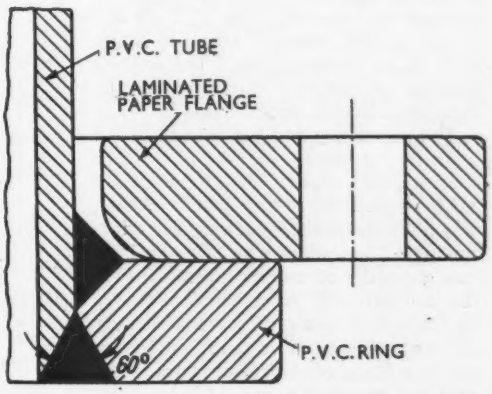


Fig. 9 (right)—Welding of ring 16 to cylindrical pipe.

design. The recommendations and hints can be extended to the whole construction. The size and position of the separator in relation to the total plant can be seen in position 4 of Fig. 1. The line drawing (Fig. 5) shows the individual parts. Part 1 is a loose flange of laminated paper ("Trolitax") machined with a cutting speed of about 360 ft./min. The projecting flange, 1a, of the pipe connector is moulded according to the German Standard DIN 8067. For fitting to the pipe connector its internal diameter is about 0.04 in. smaller than the external diameter of the pipe. The end of the pipe is heated with warm air or in a heating chamber to 130 degrees C. (266 degrees F.), when it assumes a plastic condition and can easily be introduced into the pipe connector. It is then cooled with cold water. After connector and pipe-end have been fitted in this way, the connector is again removed, and both parts are prepared for welding. After brushing the parts with a cement solution they are again fitted together, and owing to the sensitivity of edges against fracture, a welding seam is only made on the face end (Fig. 6).

To produce the cylindrical pipe with conical enlargement indicated at 12 in Fig. 5, a wooden mandrel and a guiding tube of steel are used (Fig. 7). The upper part of the cylindrical tube is heated to a temperature of about 115 degrees C. (240 degrees F.) and enlarged by driving in the mandrel. About 5 ins. of the lower part of the tube is kept cold so that the guiding tube can be placed on it, and this part of the tube does not participate in the deformation. The driving in of the mandrel may be performed with a hammer or under a press. After cooling and removal, the end is cut off with a band-saw and cleaned with a scraper. The cutting speeds of the band-saw correspond to those used in woodworking.

The container (part 13, Fig. 5) consists of a cylindrical piece of $15\frac{5}{16}$ in. internal diameter and $16\frac{5}{16}$ in. height. This cylindrical part is closed by a conical lid of $15\frac{3}{4}$ ins. diameter and $1\frac{9}{16}$ in. height; both parts are made of p.v.c. (Trovidur) plates of 0.236 in. thickness. For the conical part, at first the material is marked, cut out and prepared for welding. After heating to 130 degrees C. (266 degrees F.), it is roughly shaped into conical form. When welding the seam in a fixture against a support consisting of a steel tube (Fig. 8), at first a bead of 0.6 in. wire diameter and 10 supporting layers with 0.120 in. diameter are made. After this the cone is heated and driven over a wooden mandrel to improve its shape. The material for the cylindrical part is prepared in the same way and first bent in such a way that the edges of the welding seams are opposite to one another and are 0.02 to 0.04 in. apart. The welding is performed with the same number of beads as before. The cylindrical part is also heated a second time, reshaped by a wooden mandrel and quickly cooled in water. The component 15, consisting of two loose flanges, is produced in the same way as component 1. The two fixed flange rings 16 are, however, produced from flat strips, 53 in. long, $1\frac{3}{8}$ in. wide and $\frac{13}{16}$ in. thick. The strip is preheated to 130 degrees C. (266 degrees F.) and bent over a wooden ring, then welded together at the prepared ends. The welding bead is smoothed by rasp and scraper to the thickness of the flange. The internal diameter, which must later be

Fig. 10 (above).—Support and tangential inlet pipe for drip-water separator.

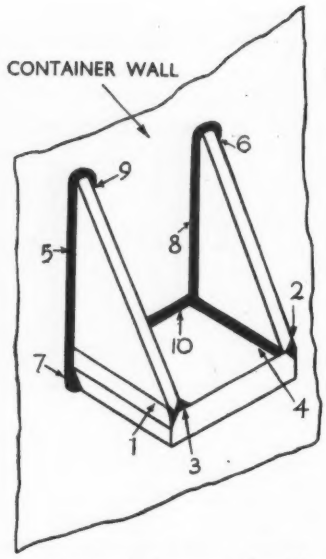


Fig. 11 (above).—Sequence of welding operations for supporting bracket on container wall.

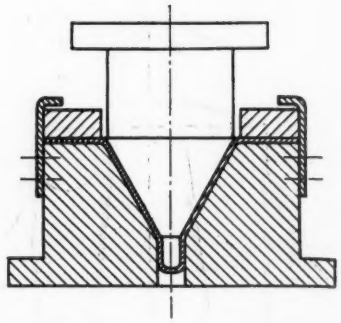


Fig. 13 (above).—Deep-drawing die of hardwood for funnel 8a.

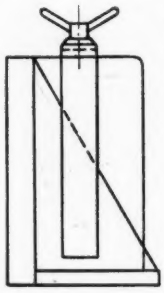


Fig. 12 (left).—Welding fixture for supporting bracket.

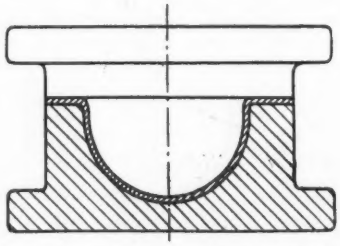
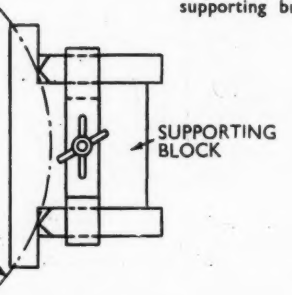


Fig. 14 (above).—Deep-drawing die for spherical cap 9a.



welded to the cylindrical part, should be turned in the lathe. In order to ensure continuous contact, the "Trolitax" flange is well rounded where it comes near to the welding seam. The welding seam at the face, which serves as sealing face, must also be machined (Fig. 9).

The production and the welding of the supports, as shown in Fig. 10, require careful preparation. The supports are made of plates of $\frac{5}{16}$ and $\frac{3}{8}$ in. thickness, which are machined by sawing and edge-milling. The numbers in Fig. 11 indicate the order of welding operations for the support and its connection to the container. In order to prevent warping of the support parts and to ensure accurate fitting of the gusset plates to the wall, the jig shown in Fig. 12 is used. By means of a steel bracket, the gusset plates are pressed against a block placed on to the horizontal flange. The seams 1 and 2 in Fig. 11 are only stressed under compression and can therefore be machined without risk to obtain smooth surfaces.

In the upper part of Fig. 10 can be seen the inlet pipe and flange, which are indicated in Fig. 5 as items 21 and 22 respectively. At first a pipe of a nominal diameter of 4 in. (according to German Standard DIN 8062) is adapted to fit against part 13 and is then used as a template to mark the intersection with the cylinder 13. The marked portion of the cylinder is cut away with a hand milling cutter, and ultimately the pipe is clamped on and welded. When fitting part 12 to the cover of part 13, both parts are adjusted with an assembly template, temporarily attached and welded. The sieve-plate 18 is cut on the bandsaw, turned on the lathe down to the correct dimension and the holes are drilled and deburred. The support of the sieve is made from flat strip like part 16 and welded into the cone 20.

Shaping Technique

Finally, as a typical example of the shaping of thermoplastic material, the methods of shaping parts 8 and 9 will be given. The actual funnel 8a is made of sheet material of 0.120 in. thickness in a die (Fig. 13). Upper and lower dies consist of "Lignofol" high-density wood, whereas the blankholder is made of steel. For a thickness of 0.120 in., the weight of the blankholder is sufficient to prevent the formation of any folds. The forming is carried out in a single operation at a temperature of 115 degrees C. (239 degrees F.). The funnel tube 8 is enlarged during heating by means of a suitable mandrel, and is drawn over the funnel pipe after cooling down. The connection of these parts is preferably not welded, but cemented. This is recommended as, unless great care is taken, the shaped thermoplastic materials have a tendency to recover their original shape when subjected to the heat of welding.

The housings 9 and 9a are produced in a similar way. The hemispherical cap 9a is produced from a p.v.c. sheet ("Trovidur") of 5/32 in. thickness. For the deep drawing in one operation (Fig. 14), no blankholder is required. The shaping temperature is 125 degrees C. (257 degrees F.). When subsequently welding the hemispherical cap to the pipe end 9, the heating should be performed very carefully, as the cap also tries to recover its original shape during heating. Therefore during welding a supporting jig should be used, preferably of a heat-conducting material, to counteract this tendency.

STRESS-STRAIN CURVES FOR PLASTICS

An optical method for determining the stress-strain curve of plastics. W. M. Muenzinger describes a new method for the accurate determination of the stress-strain curve without mechanical magnification. Apparatus consists of a camera containing light-sensitive paper on a drum driven by a watch movement. A slit in the apparatus is arranged in the same direction as the downward movement of the sample in the tensile testing machine. Marks on the sample are then reproduced as characteristic lines. ("Kunststoffe," 1950/Nov./359.)

World's Industry Employs Plastics

GENERAL ENGINEERING

Plastic piping for coolant supply.—N. Palmer points out that usual rigid pipe connections for machine tools cause some difficulties which are overcome by p.v.c. plastics tubing. Methods of use are described. ("American Machinist," 1951/April 16/172.)

Injection moulds.—The German Standards Institution has issued a standard DIN 16 750, March, 1951, on nomenclature of the individual mould components. A number of sectional drawings of different moulds are given and on these the components are explained.

Standards for compression and injection moulds.—The German Standards Institution has issued a new Standard Din 7710, March, 1951, on moulds for plastics, which fixes tolerances for dimensions. Commercial tolerances for general dimensions are also given, in particular, tolerances for wall thickness, centre distances of metal inserts and for radii.

Compression mould design.—Factors governing component design, variations in powders, single-impression moulds, dowels. Description of multi-impression mould and discussion of methods of ejection. ("Practical Engineering," 1951/May 18/454.)

Hydraulic presses for rubber and plastics industries.—H. A. Trishman surveys the hydraulic presses built at present and their use. ("India Rubber World" (New York), 1951/**123**/673.)

Present-day applications and treatment of plastics.—Prof. K. Krekeler reviews the value of plastics for the engineering industries and deals with problems such as machining, welding, pre-heating, etc., as revealed at a colloquinum on plastic treatment in October, 1950, at Aachen. ("VDI-Zeits," 1951/May 11/398.)

Strength testing of textiles and plastics.—K. Frank describes a new vertical tensile-testing machine equipped with an electromagnetically controlled extensometer. Force is measured by pendulum. Speed of spindle can be varied by friction gear from 5 to 1,000 mm./min. ("VDI-Zeits," 1951/May 11/405.)

Photoelastic stress analysis utilized for design purposes.—M. M. Leven shows that knowledge of stresses and their distribution in machine components under actual service loading often enables better and more economical design. The polariscope, basic relations and some applications, as well as properties of photoelastic plastics are discussed. ("Materials and Methods," 1951/Mar./70.)

CHEMICAL

Moulded plastics fittings for plastics piping (Carlon Products Corp., 10, 225 Meech Ave., Cleveland, Ohio), can be used with the same manufacturers' plastic pipe. A hexagonal head is provided on these single-piece units, as well as international pipe threads. ("Product Engineering," 1951/Jan./229.)

Seamless nylon balls are produced by Ace Plastic Co., 91-30, Van Wyck Blvd., Jamaica 1, N.Y., with close tolerances (±0.0001 in. diameter, 0.001 • in. sphericity); they can be used in valves, valve components, special friction bearings, mechanical checks, etc. Sizes: $\frac{1}{8}$ to $\frac{3}{4}$ in. ("Product Engineering," 1951/Jan./234.)

Degradation of Polyamides.—Films of polyamides were exposed to heat, ultra-violet radiant energy and different atmospheric conditions. The degradation products were collected in some cases and analysed by mass-spectrometric techniques. The unexposed and exposed specimens were examined by infra-red absorption, ultra-violet absorption, viscosity of solutions, measurement of dielectric constant and dissipation factor, photomicrography, X-ray diffraction, electron microscopy, electron diffraction and effect of organic liquids. No single method gives a complete picture, but the results from several of the methods give an insight into the mechanism. (Journal Research Nat. Bur. Standards, 1951/May/391, Research Paper 2210.)

MISCELLANEOUS

Use of plastics in preparing fossils.—H. A. Toombs and A. E. Rixon, Brit. Museum (Nat. History), have developed a "transfer method" for preparing fossils, using acetic acid together with the synthetic resin "Marco" SB 26C, which gives high transparency. ("Museums Journal," 1950/Aug./105, and "Nature," 1951/**167**/632.)

Inflammability of plastics foam material.—O. Lissner and J. Lenz report on laboratory and model tests of "Iporka," using smouldering medium-size and strong fire. ("Kaeltetechnik" (Karlsruhe), 1951/No. 2/27.)

Synthetic fibres.—Dr. Liesegang gives a survey of the hitherto developed p.v.c. and p.c. mixed polymerizate fibres. He deals in particular with the p.c.u. fibre of Badische Anilin and Sodafabrik; raw material position, production, properties and application. ("Melliand Textilberichte," 1951/**32**/169-172.)

Types of laminated plastics.—The German Standards Institution has issued a new Standard DIN 7735, March, 1951, on types of laminated plastics, with the purpose of ensuring uniformity of different manufacturers of the same product. The materials are classified into seven main groups, each of which contains a number of materials. Altogether, 35 different materials are listed.

Trends in Plastics.—The history of plastics development parallels that of ferrous metals. The modern trend is not so much development of new species, as on their blending, as seen with the new rubber-plastics blends and the elastomeric-thermoplastic blends. ("Product Engineering," 1951/May/154.)

Flameproof nylon fabric is obtained by treatment with thiourea-formaldehyde resin. Following curing, the fabric is well scoured below the boil in a slightly alkaline solution to remove excess acid. Rinsing, extraction and drying complete the procedure. ("Textile World," 1951/Mar./130; McGraw Hill Digest, 1951/June/24.)

Interpretation of test data.—Conventional test results are sometimes not reliable guides in the design of moulded plastics. W. Schack obtained data by new test apparatus and on individual test models which are said to lead to sounder designs. ("Materials and Methods," 1951/April/66.)

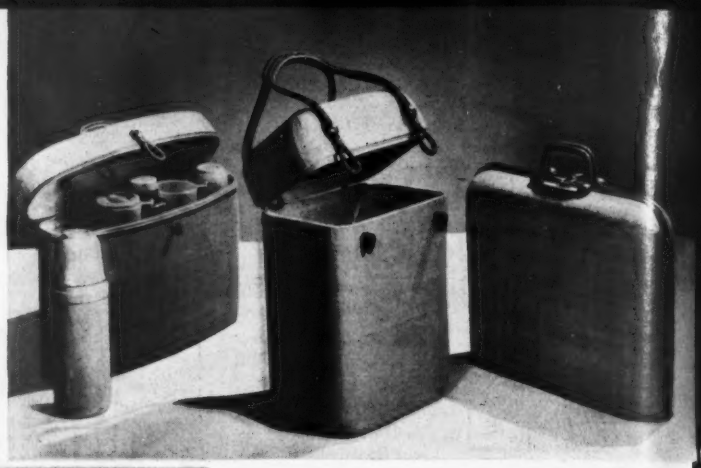
What are plastics?—The problem of definition of plastics has been discussed in detail ("Tidsskrift for Kjemi, Bergvesen og Metallurgie," 1951/April/56.)

German plastics industry.—A working committee of the associations representing producers of base materials and of manufactured products called "Arbeitsgemeinschaft Deutsche Kunststoff-Industrie" has been formed at the centre at Frankfurt. Director G. Matulat, Hamburg, and Dr. R. Röhm, Wuppertal, have been appointed as chairmen; managing directors are H. Tschacker and Dr. G. Suhle. Purpose of the working committee is to secure the raw material supply and the establishment of a plastics laboratory for the solution of chemical and technological problems. ("Industrie Anzeiger," 1951/May 29/460.)

PLASTICS
IN THE SERVICE OF MAN

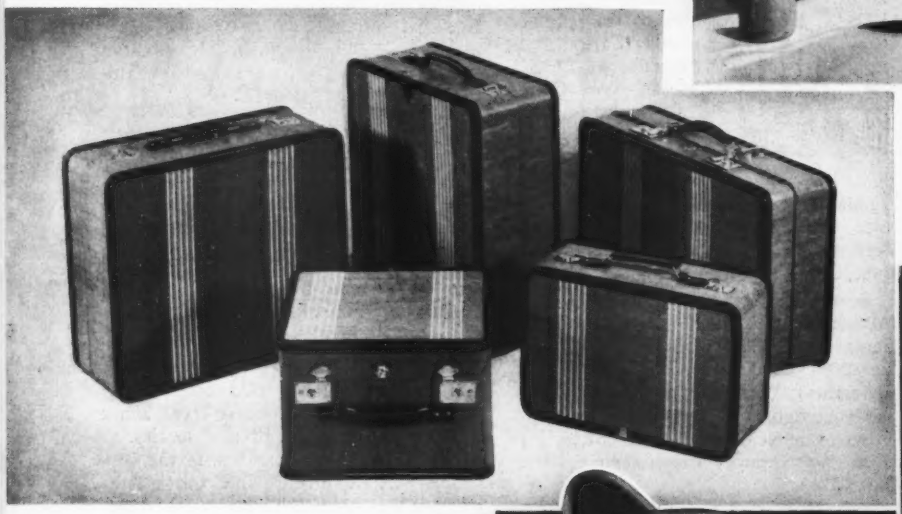
A pictorial review of high-quality units moulded or otherwise fabricated in Great Britain . . .

19. Travel Goods



(Above) These picnic cases manufactured by Fibrenyle, Ltd., have a "Fibrenyle" thermoplastic shell covered with canvas.

(Below) Case from the "Viking" series of hand-luggage manufactured by S. Clarke and Co., Ltd., with "Fibrenyle" shell covered with rayon canvas also employing a moulded plastics handle.

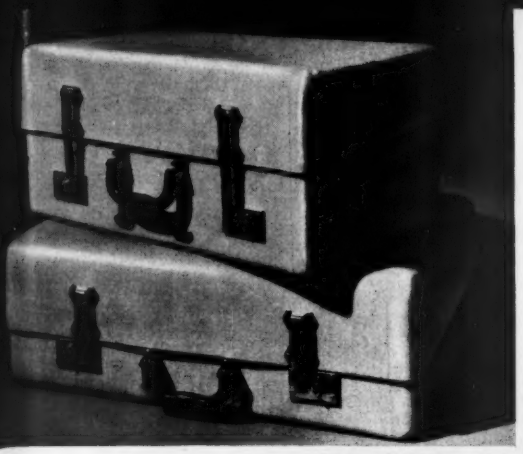


(Above) These Revelation "Rev-Robe" cases made by W. Wood and Son, Ltd., use p.v.c. extrusion to protect the edges from wear and impact. Internal fittings include polystyrene coat-hangers.

(Below) Plastics cover inside and outside surfaces of the "Watajoy" train case made by S. Clarke and Co., Ltd. The outside is I.C.I.'s "Vinide" ivory imitation cowhide; on the inside polythene film protects the printed rayon pattern and p.v.c. extrusions provide straps for bottles.

(Left) The "Pak Flat" bag for light weight air travel is made by P. Pell and Son, Ltd., from cloth-backed plastic material; extruded plastics are also used in its construction.

(Below) "Tygan" cloth woven by Fothergill and Harvey Ltd. from polyvinylidene chloride monofilament provides colourful patterns and gives a hard-wearing, easily cleaned surface to travel goods.



(Above) Two cases with expanding locks designed and manufactured by Fibrenyle, Ltd. and made with "Fibrenyle" shell covered with plastic leathercloth. (Photo: Council of Industrial Design.)

(Right) Cloth-backed plastics sheeting made by Dermide, Ltd., incorporating coloured printed patterns are suitable for providing water resistant beach bags and similar articles.

(Left) The "Flexigrip" slide fastener made of extruded p.v.c. is used by firms such as Denbar, Ltd., and Redmayne and Sons, Ltd. for the manufacture of toilet bags and similar articles.

(Below) These luggage handles, together with the staples for fixing them, are moulded in phenolic material by Lacrinoid Products, Ltd.

(Above) Plastics in various forms find many uses in the fittings and the construction of picnic baskets, including this outfit by G. W. Scott and Sons, Ltd.

(Below) Postformed "Bakelite" laminated sheet is used by Thermo-Plastics, Ltd., in the construction of a robust light-weight travelling case.

(Left) The "Clipper" case by S. Clarke and Co., Ltd. is covered with "Tygan" woven plastics monofilament made by Fothergill and Harvey, Ltd. The coat hanger is in ivory polystyrene.

(Below) The "Revelation" train case, made by W. Wood and Son, Ltd., is produced on "Fibrenyle" foundation.

(Above) The military brush and comb set, with cellulose acetate backed "Bexan" filled brush, is housed in a p.v.c. imitation hide case.

Developments in Telephone Cables

AN event of notable significance in the development of land line telecommunications and one which may well have a far-reaching effect on the whole technique in this field is taking place in Denmark, where a new all-plastic type of carrier-frequency multiquad underground cable is being laid by the Copenhagen Telephone Co. as part of a large scheme of expansion for the company's communications system.

Two cables, one for each direction of transmission, have been developed and manufactured by the Telegraph Construction and Maintenance Co., Ltd., Telcon Works, Greenwich, London, S.E.10. These cables are insulated and sheathed with "Telcothene," a thermoplastic based on polythene, and are designed to provide 48 speech channels per pair in a frequency band from 12 to 204 kc/s., giving a total of 1,152 circuits for the two 12-quad cables.

Conductors of diameter .040 in. (25 lb./mile) were chosen instead of the usual .050 in. (40 lb./mile), since the distance necessitates an intermediate repeater in either case. Each copper conductor is insulated by an extrusion of "Telcothene" to a diameter of .102 in., opposite cores in any one quad being coloured similarly for identification of pairs. Four cores are laid up round a separately extruded cord (also "Telcothene") to form the quads, which are left unfilled so that there are air spaces in the interstices, and different suitable lengths of lay are used for each quad. Twelve quads are laid up, three in an inner layer and nine in an outer layer, and bound together with a thin "Telcothene" tape. Over this is extruded a tubular sheath of the same plastic material (.065 in. radial thickness), which is applied sufficiently tightly to lock the quads lightly into position, thus ensuring during subsequent processing and laying the stability essential with a high-grade balance. Finally, a screen of thin copper tapes is lapped over the sheath, and is protected by alternate layers of compound and bitumenized paper tape.

For laying in a trench, the cable is served with compounded jute, armoured with two steel tapes each .030 in. thick, and finished with two compounded hessian tapes. The overall diameter is approximately 1.63 in. and the weight is 4 tons per mile.

For drawing into ducts, the cable is finished with an outer sheath of polyvinyl chloride of .10 in. radial thickness, extruded directly over the copper tape screen. In this case the overall diameter is approximately 1.35 in. and the weight is 2.2 tons per mile.

The dielectric constant of "Telcothene" being 2.3, the capacitance and low-frequency attenuation of these cables are greater than for the normal paper-insulated type. However, owing to the low power factor, the attenuation rises more slowly with frequency, so that at 200 kc/s it is no greater than for paper-insulated cable with the same size conductors. For 60 db. attenuation, maximum repeater spacing with 25-lb. conductors is about 12 miles for 48-channel working, and with 40-lb. conductors it is about 16 miles for 48-channel working or 14 miles for 60-channel working.

The light weight of the cables, due to the absence of a lead sheath, makes installation very easy. Two lengths of 250 metres can be pulled into the trench in half an hour, the maximum tension being only about 400 lb., a fraction of what the cable will stand without damage.

A method of jointing by injection moulding has been

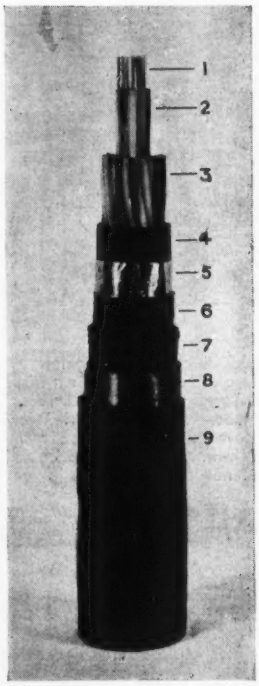


Fig. 1.—"Telescoped" section of 12-quad plastics-insulated land communication cable, showing layers of:

1.—Copper conductors (.040 in. diameter).
2.—Three inner quads each of four "Telcothene" insulated conductors.
3.—Nine outer quads of insulated conductors.
4.—Extruded "Telcothene" sheath (.065 in. radial thickness).
5.—Screen of thin copper tape.
6.—Alternate layers of compound and bituminized paper tape.
7.—Compounded jute.
8.—Armour of .030 in. steel tapes.
9.—Compounded hessian tape.

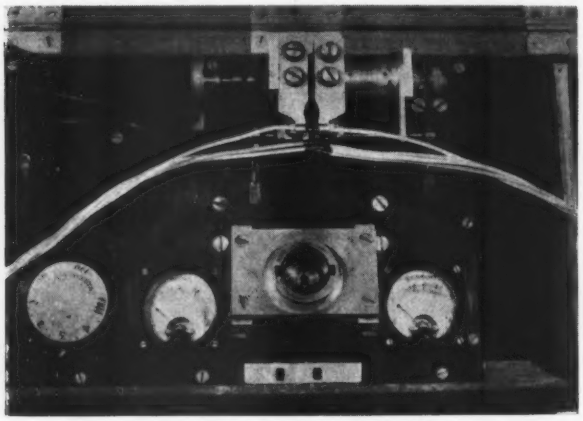


Fig. 2.—Top of the cable-jointing equipment showing a quad in position for butt-brazing of conductors. Three wires have been jointed and a fourth is being held in the welding jaws.

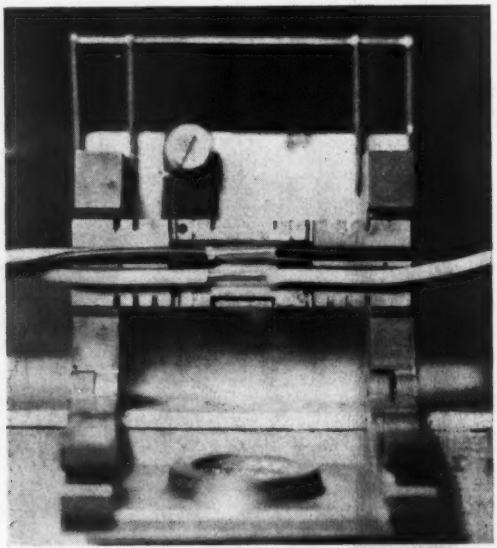


Fig. 3.—The jointed wires in the mould prior to heating with hot nitrogen.

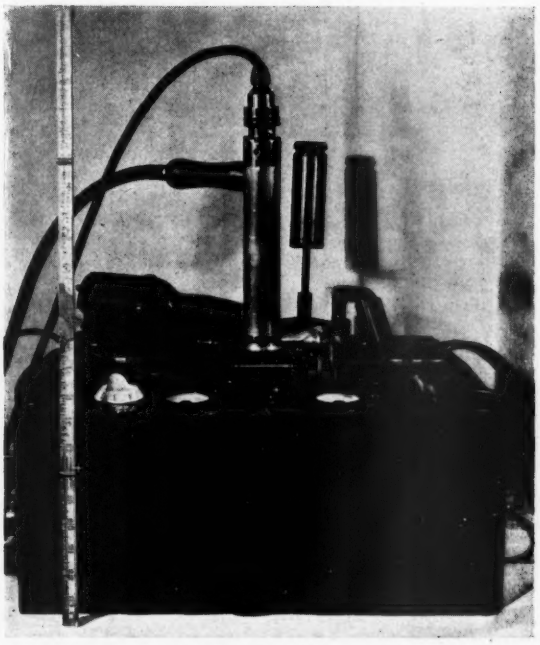


Fig. 4.—The quad in the mould being heated with hot nitrogen from an electrically-heated gun. The size of the complete equipment is indicated by the 2-ft. scale on the left.

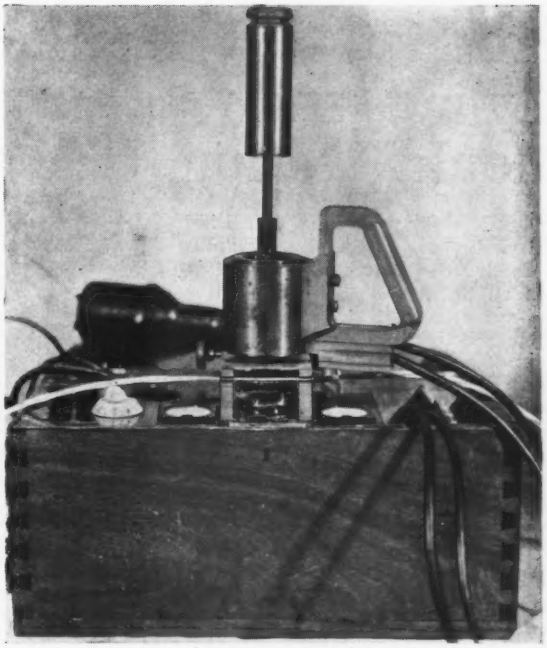


Fig. 5.—Injection of hot "Telcothene" from the injector into the warm mould.

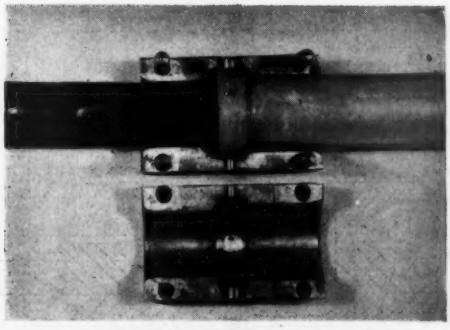


Fig. 6.—Method used for moulding ends of the "Telcothene" sleeve to the "Telcothene" sheath.

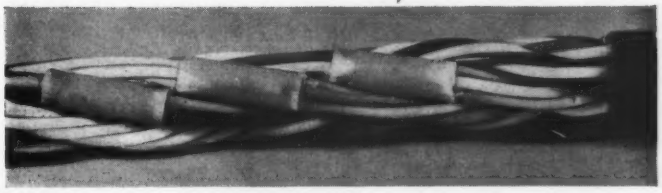


Fig. 7.—Seven-quad 40 lb. cable showing three quad joints laid back prior to replacement of the sleeve.

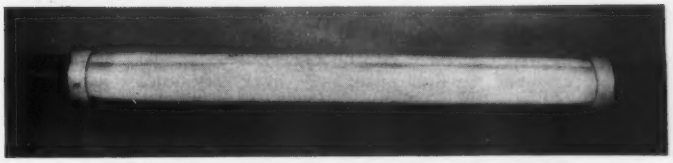


Fig. 8.—A completed joint with sleeve moulded to the sheath at both ends.

developed and is suitable for use in the field, the heat required being supplied by current from a 2-kW petrol-driven generator. Conductors are butt brazed in a small electric welder, using fluxless solder, after which the insulation joint is made in each quad as a whole. A quad is placed in a small mould, which is then heated internally by warm gas, and meanwhile a "Telcothene" charge has been heated in an injector. When correct temperatures have been attained, the injector is placed over the injection hole of the mould, and its piston is released. Immediately "Telcothene" emerges from the spew holes, a stream of cold air is played on the mould to hasten cooling; the mould is then opened, and the completed quad joint is removed. All quads having been jointed and laid into position, a "Telcothene" tube, which had previously been slipped over the cable sheath, is slid back into place.

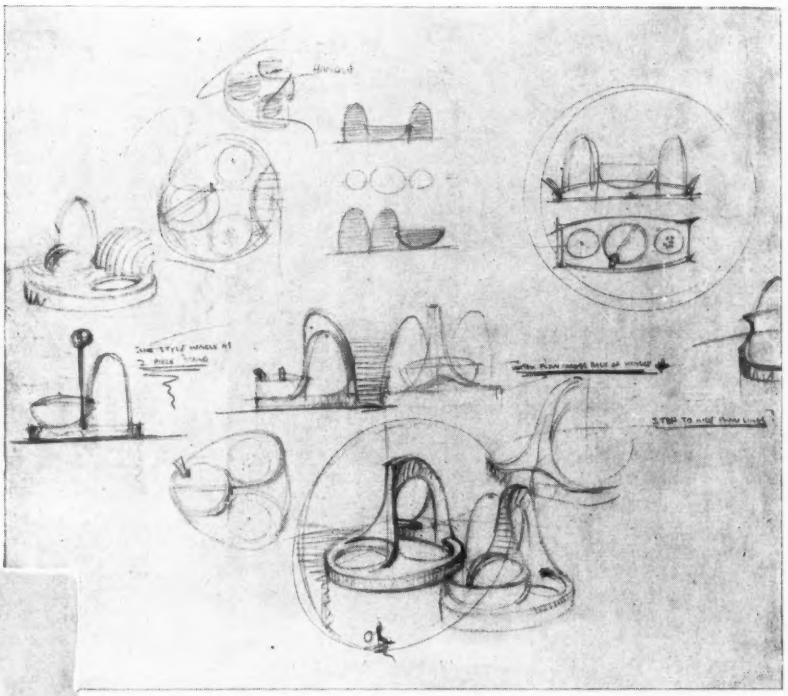
By a similar technique using a ring mould, the tube is welded to the sheath on each side of the joint, after which the screen, armour, etc., are replaced and made good. Joints can be blocked by injecting a special compound into the plastic tube.

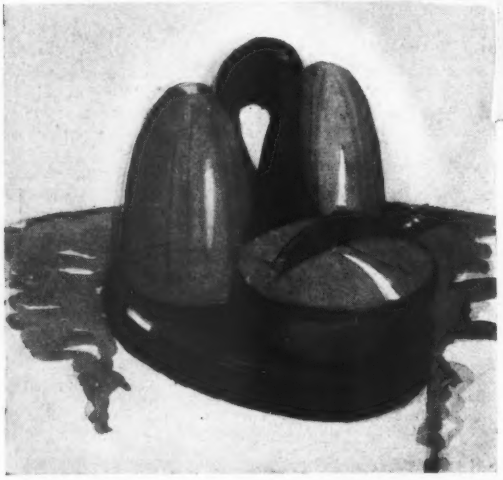
Fault liability with these new cables is low, but should major mechanical damage penetrate the sheath without damaging the insulated conductors, circuit continuity is maintained, although ingress of water would inevitably reduce carrier frequency facilities until a repair is effected. Wet cable can be dried in the usual manner by the passage of dry gas. In order to detect and locate sheath faults, bare copper wires have been included in the cable; these are available for an insulation guard circuit operating an automatic alarm.

The cables have been designed to permit the feeding of power through them to supply intermediate repeater stations, if desired. Equipment is being supplied by Philips's Telecommunication Industries, Holland.

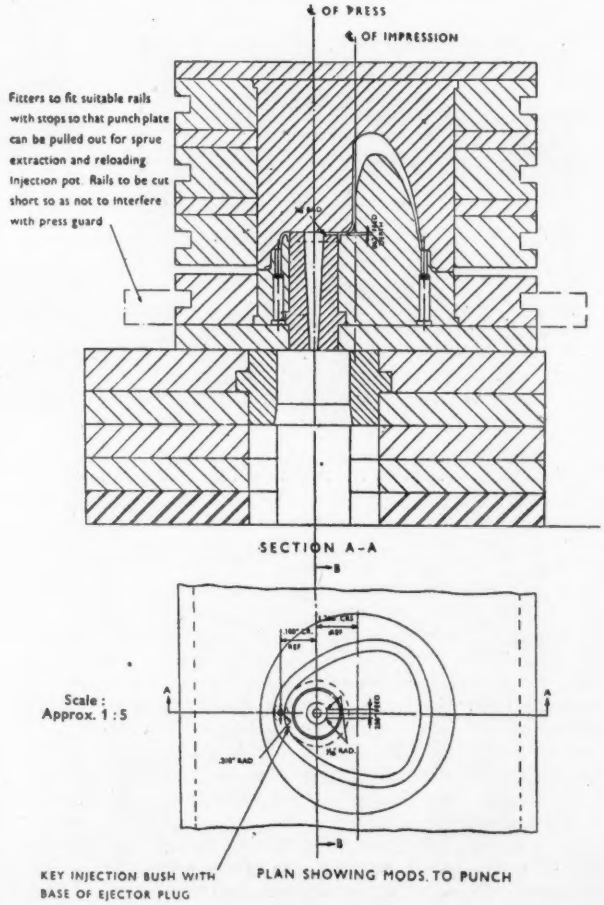
Product Styling and Mould Design

A RECENT publication by British Industrial Plastics, Ltd., "The B.I.P. Group in Practice," focuses attention on the subject of product styling and mould design. It points out that where a designer with very little knowledge of plastics moulding technique has been engaged to style plastics, the products—in the form of a sketch or a model—often look attractive enough but may not always incorporate the best principles from the mould-making point of view. In some cases they prove uneconomical to mould in their original form. Such designs, therefore, have frequently to be modified to suit the moulding process—and the final result may differ very much in appearance or in detail from that originally conceived.





(Above) Original rough sketches for condiment set. (Left) The designer's finished sketch. (Below) Part of drawing for the moulding tool.


OF PRESS
OF IMPRESSION
Fitters to fit suitable rails with stops so that punch plate can be pulled out for sprue extraction and reloading Injection pot. Rails to be cut short so as not to interfere with press guard
SECTION A-A
Scale : Approx. 1 : 5
KEY INJECTION BUSH WITH BASE OF EJECTOR PLUG
PLAN SHOWING MODS. TO PUNCH

Too often the tendency has been to suit the design to the moulder's convenience in attempting to simplify tools and so reduce production cost. Nevertheless, when certain features are incorporated in a design, that may be for good reasons, and it is the concern of the moulder to obtain suitable tools for producing the mouldings economically. Indeed, the most successful mouldings invariably result from close co-operation between customer, designer, moulder and tool maker.

Our illustrations on this page, reproduced from the publication mentioned above, relate to the styling of a three-piece condiment set, which has already been referred to in these pages (see "Plastics," February 1950, page 53). They show some of the original rough sketches made in the Product Design and Technical Service Department of the B.I.P. organization, the designer's finished sketch, and part of the drawing for the tool ultimately to be used in the moulding press. The tool was made by B.I.P. Tools, Ltd., and the moulding, in Beetle urea, was done by The Streetly Manufacturing Co., Ltd.

The main function of the B.I.P. Product Design and Technical Service Department at Oldbury is to produce product designs for users of plastics and to advise designers employed outside the plastics industry.

Plastics in Building—X

Synthetic Resins used in Conjunction with Wood

By JOSEPH B. SINGER, B.Sc.(Arch.), A.R.I.B.A.

THE use of synthetic-resin adhesives was first suggested by Dr. Baekeland early in the century and many developments have since followed, until to-day the application of synthetic resins covers many fields within the timber industry. The prominent position of these resins is due to their properties of imparting great strength to the joint and improving the dimensional stability of timber, both of which have contributed to the development of new techniques of immense value to building.

A thin sheet of paper impregnated with a phenolic resin for purposes of bonding wood made its first appearance in 1918, followed later by a resin film suitable for commercial application to plywood. The production of a waterproof plywood thus became feasible, and the introduction of phenolic resins in the form of an emulsion in water, a varnish soluble in acetone or alcohol, and in the form of a dry powder made possible a reduction of the price of the material. The advent of other types of adhesives, such as urea resins, resorcinol formaldehyde, melamine formaldehyde and vinyl esters marked a considerable progress in resin-bonded plywoods.

Adhesive is prepared by impregnating a thin sheet of tissue paper with a phenolic resin, and placing it between the veneers to be bonded and subjecting it to the required heat and pressure. Uniform distribution of adhesive throughout the assembly and retention of the same moisture content is thus ensured. "Tego" glue film is the best-known example of this type.

Phenolic resins dissolved in denatured alcohol or acetone as a varnish are applied to veneer by spraying, brushing or dipping. Alcohol-soluble resins, the most important in this group, are available in the form of dry powder, thick syrup or varnish. The liquid type of adhesive can be applied direct or with the addition of filler and catalyst. Resins in emulsion and colloidal solution are applied by a rubber roller or an automatic spreader. The resin adhesives for interior use can be extended with rye flour, which acts as a filler for porous wood and facilitates the spreading of the glue. The resins are cured in the usual hydraulic press, and this is assisted by a catalyst or hardener. A full-strength urea-resin cement is regarded as having a waterproof bond equal in strength to the average phenolic film.

Resin glues for cold pressing with phenolic- or urea-resin base are of great practical importance in the manufacture of furniture, and in veneering and general joinery work. The usual procedure is to apply the hardener to one of the surfaces to be glued and the adhesive to the other, but the actual practice depends on the type of glue, moisture content, thickness of veneer, etc.

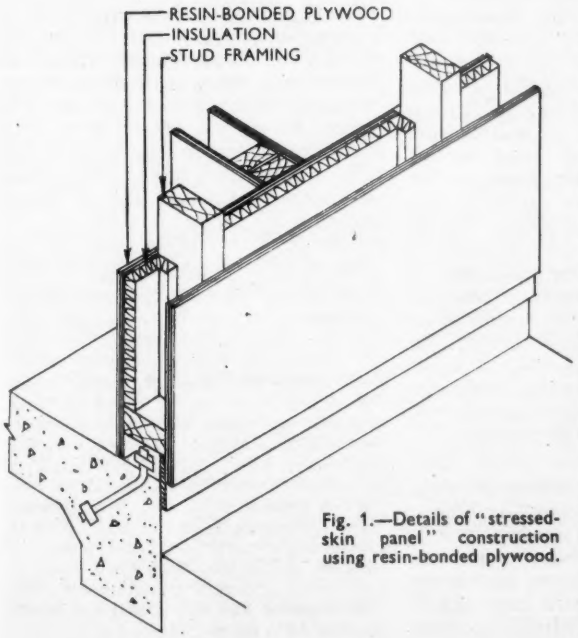


Fig. 1.—Details of "stressed-skin panel" construction using resin-bonded plywood.

The main significance of resin-bonded plywood is its use for external applications as in smooth wall construction possessing great rigidity and strength. Plywood sheets are claimed to be superior to weather boarding; they cannot be nailed, but the use of screws does not impair structural quality.

Plywood sheets can also be built into "stressed-skin panels" by pressure-gluing them to light stud frame members. Both faces are set at the same time and the glue-line heated by the radio-frequency process. The thermal insulation is improved by the insertion of a cotton blanket 1 in. to 2 ins. thick. The panels are employed in the erection of prefabricated houses, as well as other structures of a greater area. An interesting application of "stressed-skin panels" is in the construction of lightweight buildings of temporary nature where the soil is not stable. Such conditions are encountered particularly in the Arctic region, or where the prolonged presence of snow with seasonal thaw-freeze undermine the foundations. The building has to be designed to "sit" on the ground in a manner similar to a land raft. A 2- to 3-ft.-deep gravel bed, which serves the purpose of insulation and drainage, is first laid and then the building is "floated" on the top of it. A highly insulated panel floor, together with the walls and roof, form a floating raft which can rise or sink without damage when changes occur in the earth underneath. The high insulation factor of "stressed-skin panel" floor allows very little heat to radiate to the ground and cause the floor around the foundations to thaw. The walls are built from stud-frame "stressed-skin panels" with a sandwich of triple insulation consisting of fibreglass, aluminium foil and fibreboard, which serve the purpose of preventing thermal convection, radiation and conduction. The standard size of these panels is 8 ft. by 4 ft., and their light weight makes it possible for two men to handle them.

Larger structures have to be built with floors detached from the wall panels. In this case, concrete slabs are laid on solid bedrock or gravel bed with a special insulation. Ballasted outriggers are spaced along the walls of the building to give them a better stability.

An improved method of plywood manufacture is capable of producing continuous wallboards 8 ft. wide and up to 20 ft. long. Resin-bonded Douglas fir plywood panels 8 ft. by 4 ft. are bonded into a continuous sheet, with the grain of the face running across the 4-ft. width. Phenolic-type resin is used for bonding plywood veneers into three-ply $\frac{5}{16}$-in. panels, which are then jointed by passing them through an automatic electric hot press and "welding" them into a continuous length. After cooling the board in a refrigeration unit and smoothing down the joints with sanders,

the boards are placed under power sprays. One face of the panel is covered with a synthetic adhesive, to which an unbleached muslin fabric is bonded and dried under a battery of infra-red lamps. A surface finish for decoration is thus provided which is equivalent to one coat of paint.

The continuous board has the strength of joints corresponding to 75-80 per cent. of that of plywood. The elimination of many joints with subsequent saving in the erection time is of great advantage. The boards are cut to required lengths and "welded" permanently to light studs. This type of "stressed-skin panel" has a great rigidity which allows the building of thinner walls with lighter studs.

An interesting development in the waterproof plywood is the employment of a phenolic resin-impregnated paper bonded to the external face of the panel. In this laminate, softwood plies can be incorporated into the external panels, since they are protected by the phenolic-impregnated paper; the utilization of softwood veneers makes the panels more economical. A further step in this direction could be the bonding of a thin plastics veneer on the inside face of the panel to obtain a completely finished wall material.

A rapid progress of laminated wood for structural purposes has been made with the introduction of synthetic resins. The most important application of laminated wood is in the form of arches for spanning large areas. A lower moisture content and reduced elasticity compared with solid timber account for the strength of laminated structural members, which can be tapered in accordance with the amount of stress. The graceful outline of parabolic arches, the most efficient shape suitable for the material, lends itself to imaginative design. Laminated arches have been used to cover 150-ft. spans of some structures in U.S.A., while in this country the best-known example is the roof of the Exhibition entrance building from Waterloo Station, which is suspended on a series of parabolic laminated arches, specially manufactured by Airscrew Co. and Jicwood, Ltd.

In the construction of such arches, thin wooden strips of laminate are assembled and bent simultaneously over a bending form. Urea formaldehyde and resorcinol formaldehyde are used, but the gluing technique depends on the type of adhesive and manufacturers' instructions have to be followed. The bending of laminated wood is carried out by means of air clamps, hydraulic presses or by fluid pressure; the latter being superior in the uniform distribution of pressure. In the bending process, no restraint is imposed on the ends of the laminate, which can slide over each other until the glue sets, thus confining their movement and fixing them to shape. Considerable lengths are obtained by scarf-jointing the laminate end to end and staggering the joints to ensure that no appreciable weakening of the section occurs. Tubes and cylinders are similarly manufactured by the continuous-strip method. They have already been used for ship masts and spars, and their application for light structural members appears to be quite feasible.

Resin-bonded chip boards, which appeared on the market after the war as the result of timber shortages, have already been fully described. These chip boards are manufactured in standard sizes of 8 ft. by 4 ft., and their manifold applications include wallboards, panelling, furniture, flooring, concrete shuttering, etc. A considerable saving in cost and improvement in the productive efficiency are anticipated, when continuous boards of unlimited length are manufactured by means of the newly developed process by Vere Engineering Co., Ltd. It is estimated that one machine can produce 20 ft. of 4-ft. wide board a minute, and thus lower the price to about 4d. per sq. ft. at a thickness of $\frac{1}{4}$ in. These boards, under the trade name of "Celloboard," are manufactured from chipdust, wood shavings and other wood waste of a wide range, and are bonded with resins which comprise 5 per cent. of the material. The raw material is fed automatically to the hopper and spread on a steel band as an even layer to the required thickness, which may be from $\frac{3}{16}$ in. to $\frac{3}{4}$ in. The steel band conveys the material for pre-heating between the electrodes of a radio-frequency heating unit, and then the resin-bonded chippings are compressed between heated rollers to the specified thickness. In the subsequent stages of production, the temperature is closely controlled and the uniform thickness of the board maintained until the board is ready for automatic cutting. The natural finish of "Celloboard" is with wood particle "grain" which can be painted, distempered, waxed, varnished or cellulosed. Other types of facings, which can be incorporated during the manufacture, include paper, fabrics, wood veneer, plastics and metal. Plain papers provide a good key for brush or spray painting, while decorative papers give a finished surface. Hot or cold setting adhesives can be used for gluing thin wood veneers to "Celloboard." High-pressure laminated plastics veneers can also be applied as an attractive and hygienic facing to the "Celloboard" core. Lastly, a better structural strength is obtained by veneering the chip boards with aluminium or other metal foils in continuous rolls.

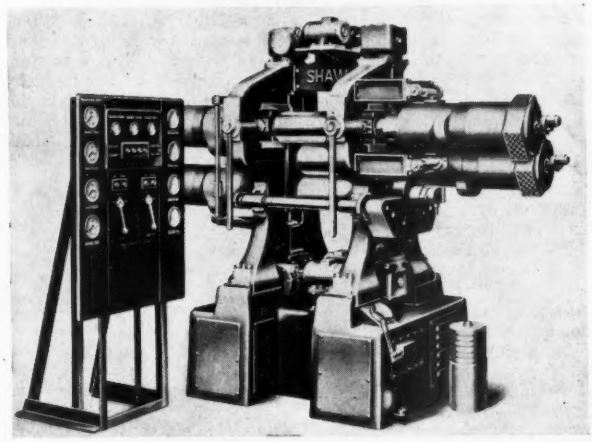
The low cost of the material offers scope for it as a core material for composite panels with more expensive finishes. Traditional finishes for timber surfaces, such as painting, staining, varnish, etc., require frequent maintenance, particularly in positions exposed to hard wear. A new plastics finish formulated from a modified urea resin is designed to improve the wearing quality of timber surface and provide a fire-resistant and decorative coating. This coating is available in all colours and also as a transparent veneer, manufactured by Saro Laminated Wood Products, Ltd., under the trade name of "SaR-ReZ." The resin can be applied to veneers, plywood and blockboard by spraying and stoving. The transparent coating is of outstanding value, since it can form a protective veneer to decorative wood grains.

A modified urea resin with suitable plasticizers is sprayed on wood panels, which are then passed on a conveyor belt under a bank of infra-red lamps. There are 216 "Osram" industrial infra-red reflector lamps in the unit, all mounted and spaced with sheet metal of high reflectivity. The loss of stray radiation is prevented by side and end reflectors. Lamps are arranged to form a bank 15 ft. long and 6 ft. wide, and the spacing between them and the conveyor belt can be varied from 12 to 20 inches, depending on the type of material. The conveyor is made of woven wire and has an overall length of 52 ft. and a width of 5 ft., moving at a speed varying between 2 ft. to 6 ft. per minute. A special arrangement permits switching on the required number of lamps and also enables the control of heat intensity to suit stove finishes of different compositions for woods of varying type and moisture content. Stoving and air-drying "SaR-ReZ" finishes are produced, the former developing its full hardness immediately on removal from the oven, while the latter type takes some weeks before its full hardness is obtained. The finishes have a high polish, but this can be further improved by a mechanical polisher and ordinary burnishing compound. There is a considerable field open for this type of finish in building applications, such as plywood wall panelling, flush doors, etc. The object of this synthetic coating is to reduce the amount of site work to a minimum and enable completely finished building components to be supplied ready for erection and fixing. Damage to the coating in the course of transit can only be prevented by careful packing and handling, although the finish can be easily touched up after completion of building operations.

BRYNMAWR RUBBER, LTD.—A new factory, sponsored by the Board of Trade, through the Wales and Monmouthshire Industrial Estates, Ltd., has been erected at Brynmawr, South Wales, on behalf of Brynmawr Rubber, Ltd., a subsidiary company of Enfield Cables, Ltd. Its production lines will include soles and heels, flooring, grommets for motor cars, pedal rubbers for bicycles, special mouldings for a range of engineering customers, insulating tape, latex rubber gloves, and thin rubber and plastic sheeting for various trades.

PRODUCTION NEWS

Raw Materials, New Plant, Works Organization, Control Apparatus, Research, Personal and Trade Notes



This new calender, for laboratory use, was shown by Francis Shaw and Co., Ltd., at the recent Plastics Exhibition in London.

LABORATORY CALENDER.—This new machine by Francis Shaw and Co., Ltd., Corbett Street, Ashton New Road, Manchester, 11, has been designed primarily as a small prototype for laboratory use and to provide data for the design of larger machines incorporating similar features, although not necessarily of identical design.

Each of the 16 in. by 8 in. rolls are driven by an individual variable speed motor, thus enabling any desired friction ratio to be obtained between the maximum and minimum speeds of the rolls, or all rolls can be driven at even speed. Flood lubrication to the main bearings is incorporated from a separate pump which also feeds the main gearboxes. An interlock prevents the main motors being started up before the oil is circulating at the correct pressure, and if this pressure fails the calender will automatically stop. A zero-clearance arrangement is fitted to the top roll to maintain correct nip-setting under all load conditions. Each roll adjusting screw is driven by its own motor. The control panel incorporates individual tachometers for each roll, so that any desired combination of roll speeds can be obtained on the control panel by push-button control. Oil pressure and temperature gauges are also grouped in a convenient arrangement. The complete machine was shown for the first time at the recent British Plastics Exhibition in London.

AUTOMATIC METAL DETECTION.—Equipment for detecting offending metal particles in any non-metallic products has recently been developed by Loma Electronic Equipment, Ltd., 217, Hoe Street, Walthamstow, E.17. The product to be tested is made to pass through a detecting head (with an aperture of size and shape appropriate to the product), which is electrically connected to an electronic control unit. This may be up to 100 ft. away. When a small metal particle embedded in a product enters the aperture in the detecting head, the control unit reacts and can give either a visual or audible warning, or can stop the conveyor band and/or drop a marker on to the band. Thus the position of the offending metal is localized and it can readily be removed by hand or diverted. The "Metaltector" is entirely automatic and, once installed, does not require to be watched by eye as is the case with X-ray inspection. The only necessary adjustment is such that this can be made by unskilled operators.

GAUGE AND TOOL MAKERS ASSOCIATION is arranging for a group of directors of member-firms to travel to Paris to visit the first European Exhibition of Machine Tools, which is being held in the Parc Des Expositions, Porte de Versailles, Paris, September 1 to 10.

INDUSTRIAL ART BURSARIES.—The Royal Society of Arts' annual Industrial Art Bursaries Competition will this year include two sections for the design of p.v.c. plastics sheeting and of laminated plastics. The primary purpose of the competition is to allow successful candidates to broaden their knowledge and experience by travel abroad to study foreign design, or, in certain cases, to obtain art training or industrial experience in this country. A bursary of £150 in value is offered to the winning candidates in each of the two sections relating to plastics. The competition is open to full-time, part-time and evening-class students who are between the ages of 17 and 30 on September 1, 1951, and who intend to take up industrial design as a career. Candidates must have studied for not less than one term since September 1, 1950, at an art, architectural, technical or other college or school approved by the Society. Further particulars can be obtained from the Secretary, Royal Society of Arts, John Adam Street, London, W.C.2.

BEARINGS AND LAMINATES.—Small and Parkes, Ltd., Hendham Vale Works, Manchester 9, have sent us their brochure relating to "Railko" engineering bearings, gear wheels and laminates of the type they were exhibiting at the recent British Plastics Exhibition in London. These products, moulded under heat and pressure from phenolic resin impregnated fabric, are manufactured in more than 16 different grades to suit a range of difficult or unusual operating conditions. The brochure gives some useful notes on the use of journal neck bearings, which are commonly cooled by the use of water. By fitting these non-metallic bearings in steel mills, and with correct conditions of lubrication, a saving of power as high as 35 per cent. has been achieved.

PROJECTILE AND ENGINEERING CO., LTD.—Members of the Swedish Plastics Federation, on a recent visit to this country, made a tour of the works of The Projectile and Engineering Co., Ltd., at Acre Street, Battersea, S.W.8, where they saw the "Peco" injection moulding machines under construction. The visitors were subsequently entertained to lunch.

SUFLEX, LTD., 35, Baker Street, London, W.1, announce a change of telephone number to WELbeck 0791 (4 lines).

UNIVERSAL METAL PRODUCTS, LTD., Langley Road, Pendleton, Salford, Lancs, tells us that, due to the increasing demand for injection moulded components, they have purchased a factory in Southport in which their substantially extended thermoplastics department will be housed. The plant includes new injection presses up to 16-oz. capacity, and the company is, therefore, in a position to execute orders for a very wide range of mouldings.

O. AND M. KLEEMANN, LTD., have registered a new private subsidiary, Kleestron, Ltd., which will manufacture polystyrene moulding powder, together with other synthetic materials. The nominal capital is £100,000.

(Left to right) J. E. Janson (Swedish Plastics Federation), P. A. Delafield and R. K. Hartley (British Geon Ltd.), W. T. Cruse (Society of the Plastics Industry, Inc., New York), and W. Steans (Australia) — photographed on the occasion of a dinner given by British Geon Ltd. to celebrate the opening of the recent British Plastics Exhibition and Convention in London.

New Productions

Trolleybus Insulator

A special nylon-filled phenol-formaldehyde moulding powder is used for making the plastics insulators which form part of the overhead current distribution systems for trolleybuses and trams. These insulators, here illustrated, are made for the Anti-Attrition Metal Co., Ltd., of Maidenhead, by British Moulded Plastics, Ltd., and Moulded Products, Ltd. Their use solves the problem of insulating the heavy metal insert from its holder, where the space available is strictly limited.

Bathroom Accessory

A useful moulded accessory for the bathroom has recently been added to the range of plastics household articles made by Mendle Brothers, Ltd., Pontygenaith, Rhondda, Glamorgan. The frame, in urea, has three slots by which it can be firmly screwed to the wall. The three beakers, in different shades of urea, slide into the recesses provided, and six further slots are designed to hold toothbrushes. The beakers are moulded with good thickness and their appearance is enhanced by sets of flutes at the base.

Electric Dry Shaver

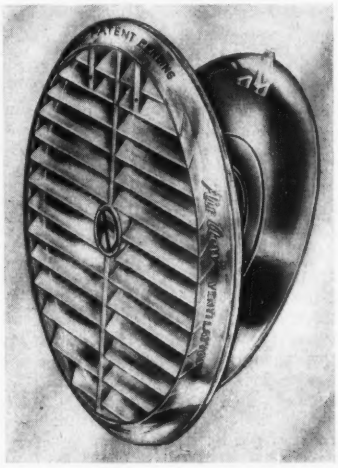
The "Kub" electric dry shaver introduced at this year's British Industries Fair, uses plastics for its housing. The smooth cream-coloured casing and the red retainer pieces for the shaving head are moulded in "Diakon" acrylic material by Injection Moulders Ltd. The adoption of a less expensive production method is one of the reasons contributing to the lower price of this model compared to a previous model in urea-formaldehyde. The makers of the shaver are Chilton Electric Products, Ltd., Hungerford, Berks.

"Skolascope"

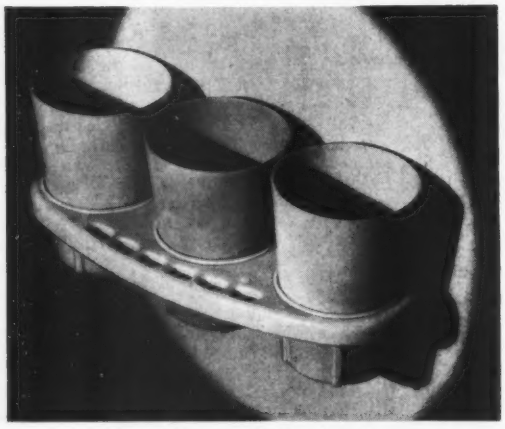
Designed especially for visual education in schools, clubs, societies and similar general instruction, this new projector for films and slides is finding wide approval. One local education authority is equipping 400 schools with the "Robin Hood" model of the "Skolascope," which is fitted with a transformer and all necessary attachments. The body is a phenolic moulding very robust in construction and is 7½ ins. high, the base being 9½ ins. by 6½ ins. The moulding is carried out by Chambon, Ltd., Riverside Works, Standish Road, London, W.6. The instrument is a production of Watson, Manasty and Co., Ltd., 34, Twickenham Road, Teddington, Middx., and was exhibited at the Olympia Section of the B.I.F.

Window Ventilator

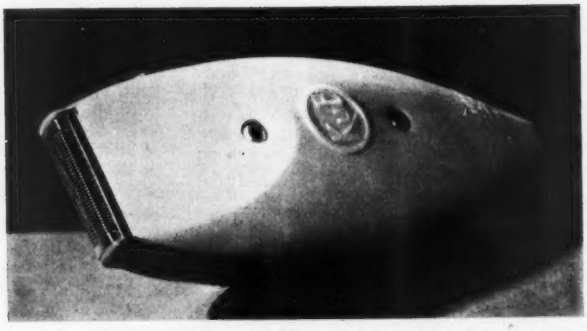
The "Air-flow" window ventilator, overall diameter 7¼ ins., is made in a glass clear moulded plastic and is fitted direct to the window pane. It is suitable for all types of windows and is simple to install. It provides for a continuous flow of air without draught, and is particularly effective when used in small rooms. For the complete removal of vitiated air from large rooms it is recommended that the ventilator is used in conjunction with an "Air-flow" exhaust fan. The ventilator can be opened or closed by means of the backflap. It is supplied in cream or brown colour. The makers are Fenton, Byrn and Co., Ltd., 21, Berrylands Road, Surbiton, Surrey.



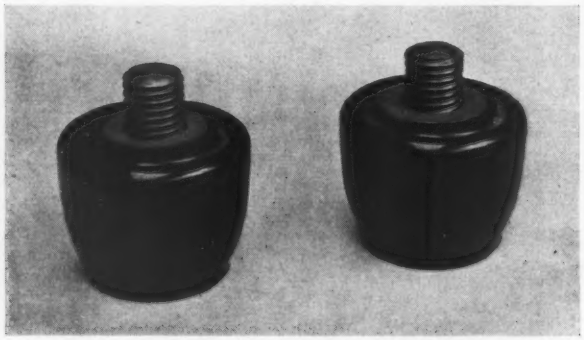
Window ventilator.



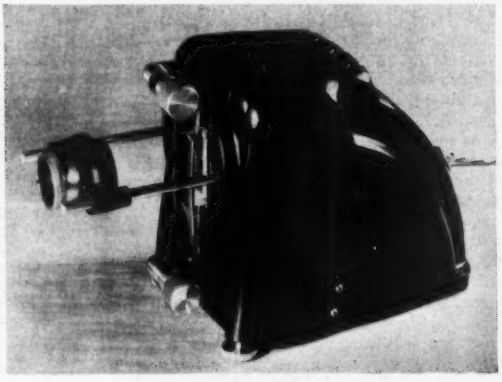
Bathroom accessory (urea).



Electric dry shaver ("Diakon" acrylic material).



Trolleybus insulators (nylon-filled phenolic).



"Skolascope" (phenolic).

Geographical globe (cellulose acetate).

Cocktail tray (laminate and extrusions)

Geographical Globe

We saw this geographical globe at the recent British Plastics Exhibition. The makers, J. F. Kenure, Ltd., Feltham, Middlesex, informed us that it is the first of such articles to be produced wholly in cellulose acetate. The globe, which is illuminated from within, is made by a blowing technique.

Cocktail Tray

This tray, by D. E. Plastic Development Co., Duke Street, Cheltenham, Glos., incorporates some novel features. The base is a laminate of metal (two sheets) and plastics, the outside finished surfaces being plastics. The top metal laminate renders the upper surface of the tray impervious to heat, as from a lighted cigarette; the lower metal laminate provides additional rigidity and counteracts any expansion or contraction. The plastics surface of the tray is unaffected by moisture, or by acid and alcoholic drinks. The rails are not moulded, but are thermoplastic extrusions formed under pressure to conform with the periphery; they are held in position by metal supports.

The principal intention in the design of the tray was a construction that would facilitate easy cleaning and handling, using materials which would allow the tray to be used under adverse conditions yet still retain its shape and finish. Lightness in weight (16 oz.) is another advantage.

Air Purifier

The "Rotosan" air purifier (W. and F. Walker, Ltd., Liverpool) is in the form of a basket-like receptacle for holding chemical crystals. It is injection moulded in various pastel shades of cellulose acetate, in two parts, which are cemented together. The grille in the lower half of the front moulding promotes the free circulation of air through the crystals, and also shows when refilling is necessary. For ease of fixing to the wall, a screwdriver hole is provided in the front moulding. The mouldings are by Universal Metal Products, Ltd., Langley Road, Pendleton, Salford, 6, Lancs.

New Application for "Clarifoil"

By laminating rayon filament yarn to "Clarifoil" transparent film, an entirely new decorative ribbon for packaging has been developed by Porth Textiles, Ltd., Dinas Rhondda, Glamorgan. Called "Silsheen," this ribbon is now in quantity production and is available in various widths and finishes.

Air purifier (cellulose acetate).

Filament yarns of various colours can be combined to produce a multi-colour ribbon, either striped or in graduated shades, and it can be intaglio printed with one- or two-colour designs by a special process, giving it an embossed effect.

As the yarn is laminated to the "Clarifoil" in continuous lengths without any cross-threads to cut the sheen, an unusually high lustre is obtained. There is, in addition, no "wrong" side, as the "Clarifoil" itself is high gloss. It has a very high tensile strength and can be looped in fancy knots and bows as many as 50 times and still retain body.

Fancy Ribbon Container

One of the illustrations on this page shows a novel form of container which Cascelloid, Ltd., are making for J. and J. Cash, Ltd., of Coventry, for displaying fancy ribbons. The container consists of a polystyrene sphere, which is held together by transparent cellulose tape. The top is drilled and a knotted piece of ribbon is inserted to provide means of suspension.

Christmas Tree Decorations

Attractive Christmas tree decorations are fabricated by M. Sachs, 8, Timberhurst Bridge Hall, Bury, Lincs. They are produced from interleaved foils of cellulose and cellulose acetate film in various transparent clear and tinted shades. The small conical "weights" serve as pivots for the vanes which rotate freely in very light air currents.

Fancy ribbon container (polystyrene).

Christmas tree decorations. (cellulose acetate film)

Machines for the Industry

The Daniels 125-ton Preforming Press

The preforming press described in this article is a new production by T. H. and J. Daniels Ltd., Lightpill Iron Works, Stroud, Glos. It was exhibited for the first time at the recent British Plastics Exhibition.

THERE is, to-day, a tendency towards bigger and better thermosetting mouldings. Correspondingly larger pellets are needed in order to reduce handling time and take advantage of high-frequency preheating. Many moulders have therefore asked for a machine to produce pellets larger than those made in the standard preforming machines. As a result, the " Daniels " hydraulic preformer was developed.

This preforming press is, we believe, the first of its type to be produced. It has been designed to produce tablets which are too large to be made on the conventional type of mechanical tabletter. The tablets can weigh up to 6 lb., and one such tablet is sufficient for a moulding which would require a large number of tablets made on a normal preforming machine. Any shape can be made which can be contained in a 6-in. diameter circle, and there is a maximum depth of fill of 6 ins. A core-pin carrier allows the production of tablets with a central hole when required.

The machine is fully automatic, although, if necessary, it can be set to perform a single cycle where hand filling of awkward materials is required. The pump motor is a 15 h.p. double-ended type and the machine is completely self-contained apart from connections for electrical supply, 80 p.s.i. air line for the timing mechanism, and cooling water for the oil.

An important feature of the machine is that pressure is applied to the tablet from both top and bottom, thus ensuring that the bottom of the tablet is firm and does not crumble. Within certain limits, the pressures applied to each side of the tablet can be varied independently. The maximum pressure which can be exerted by the machine is 125 tons.

1.—Time cycle unit. 2.—Switch for time cycle. 3.—Press button. 4.—Pump unit. 5.—Pannier tanks. 6.—Prefiller tank. 7.—Main cylinder. 8.—Bushed guides. 9.—Hydraulic line. 10.—Air supply lines. 11.—Top punch. 12.—Die. 13.—Bottom crosshead. 14.—Main pressure relief valve. 15.—Twin double-acting ejector cylinders. 16.—Double-acting cylinder for powder feed shoe. 17.—Powder hopper. 18.—Spring-loaded base of powder hopper. 19.—Sliding shoe for feed from hopper. 20.—Fill-adjusting handwheel. 21.—Air valve interlocks. 22.—Main ram control valve. 23.—Cooling circuit for oil. 24.—Balancing cylinders.

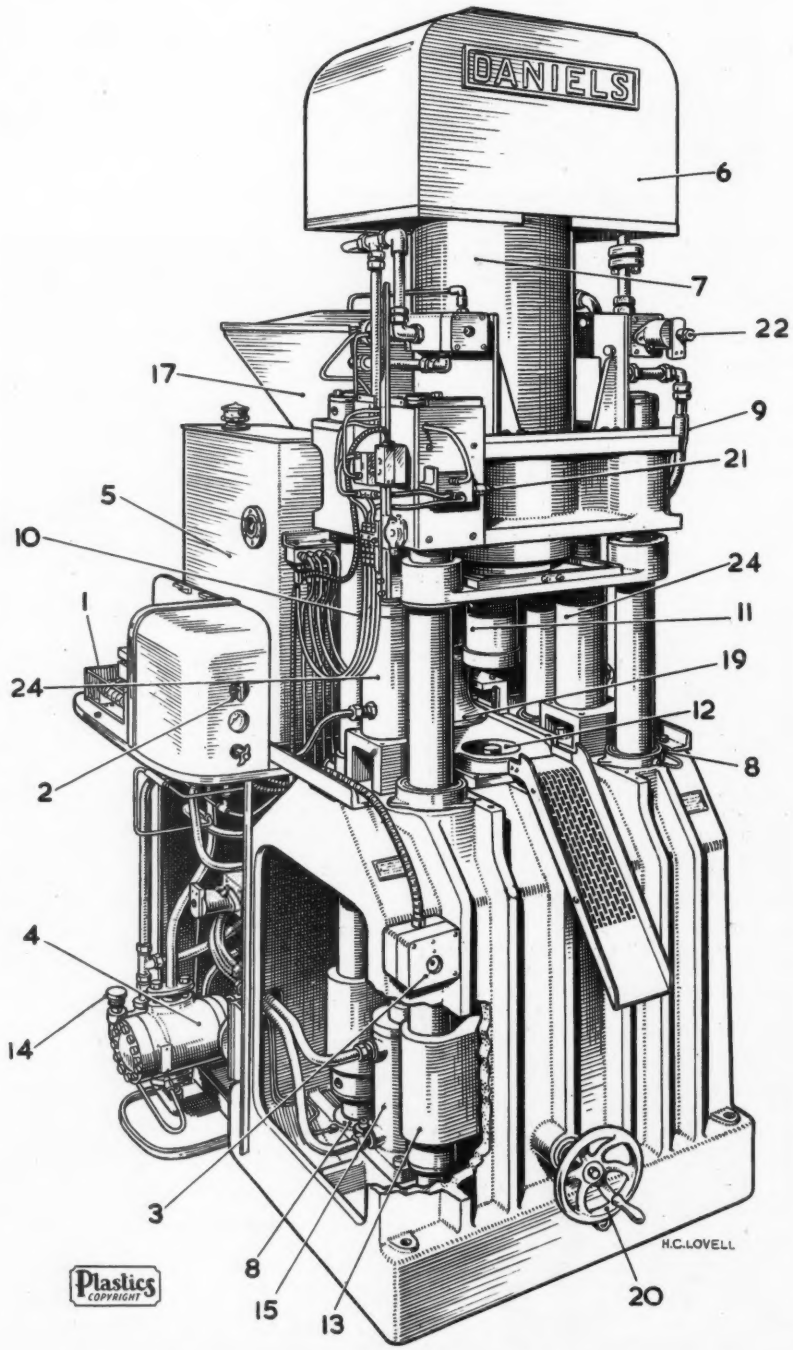


Fig. 1.—The Daniels 125-ton automatic hydraulic preforming press.

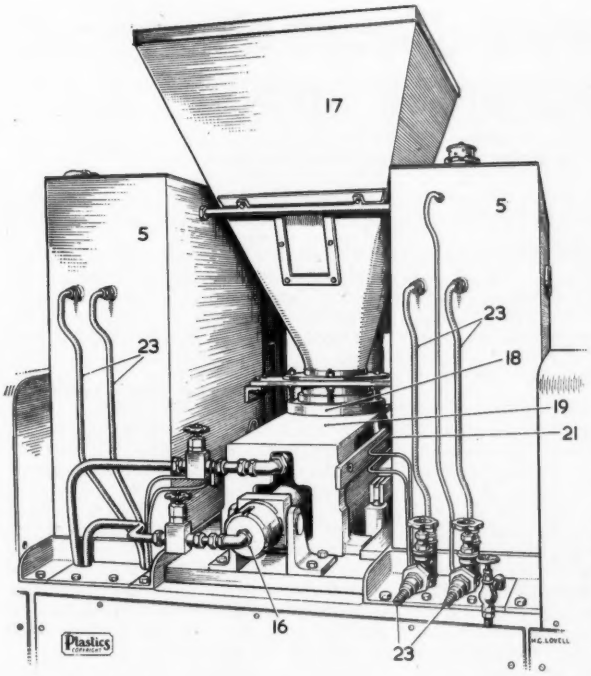


Fig. 2 (left)— Rear view of Daniels preforming press, showing sliding shoe for feeding powder from hopper to die.

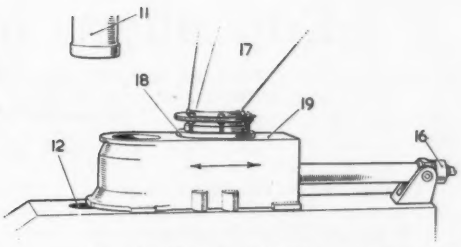


Fig. 3.—Diagram indicating movement of sliding shoe in powder feeding arrangement (see Fig. 2).

The movements of the machine are controlled by the time-cycle unit (1), which consists of a motor-driven shaft carrying adjustable cams. These lift air valves to actuate double-acting air pistons attached to the main hydraulic piston valves. The timer has a switch (2) with positions "Off," "Set," "One Cycle" and "Automatic."

In the "Set" position, the machine can be moved through its cycle by holding down the button (3). On releasing the button the timer immediately stops.

In the "One Cycle" position, pressing the button (3) will cause the machine to move through one cycle only; in addition, the powder-feed shoe movement can be stopped if it is desired to feed a weighed quantity of a difficult powder by hand from the front of the machine.

The machine is operated hydraulically by a Vickers two-stage pump unit working at 2,240 p.s.i. (4), driven by a 15 h.p. motor. The unit is mounted on the back of the cast-iron base of the machine and is fully enclosed in "streamlined" covers. A door is provided giving access to the relief valve for main ram pressure adjustment. The hydraulic oil is contained in two pannier tanks (5), and the prefiller tank (6) and amounts to about 75 gallons. The cooling circuit for the oil is also shown in the drawing (23).

The main cylinder (7) is of steel and has a double-acting ram, fitted with piston rings, of 12¾-in./12-in. diameter. To speed the downward stroke there is also a prefilling ram inside the main ram and oil is drawn through two large valves from the tank (6).

The main cylinder, columns and bottom crosshead assembly form a rigid unit which, however, is free to slide vertically in bushed guides (8). The hydraulic and air supply lines are via flexible pipes (9) and (10) respectively. Balancing cylinders (24) are fitted to compensate for the weight of the moving parts and cushion the return stroke.

The top punch (11) descends on to the powder in the die (12) and, as soon as the pressure begins to build up, the cylinder rises, lifting on the bottom crosshead (13) the lower punch so that the powder is compressed equally between upper and lower tools. Pressure then builds up to the maximum set on the main relief valve (14) and can be read on a gauge next to the valve. The time of pressure dwell may be regulated, within limits, by the timer. The main ram then returns upwards and the twin double-acting ejector cylinders (15) eject the tablet.

The powder feed shoe which is operated by a double-acting cylinder (16), is of cast iron with spring-loaded "oilite" guide blocks. The main powder hopper (17) holds just over 1 cwt. of powder and is fixed. It has a spring-loaded base (18), with renewable face bearing on the sliding shoe to prevent powder leaking out.

When the sliding shoe (19) moves forward, it first pushes the previous tablet down the chute in the front of the machine. Then, when the shoe is over the die, the ejector cylinders (15) withdraw the bottom punch to its set position and powder falls into the die cavity to fill it, thus completing the cycle.

The depth of fill and consequent size and weight of tablet may be adjusted by the handwheel (20). The amount of compression on the tablet is controlled by the pressure relief valve (14) to which reference has previously been made.

The machine is fully guarded and there are air valve interlocks (21) to prevent movements occurring out of cycle, such as the main ram descending when the guards are open or the powder shoe is forward. It cannot be operated until the guard is closed, and if the guard is opened whilst the machine is in operation, the press will immediately open also. A handle is provided to fit the main ram control valve (22) for upward and downward movements when setting up. When producing the largest tablet possible, the maximum speed of the machine is about three cycles per minute.

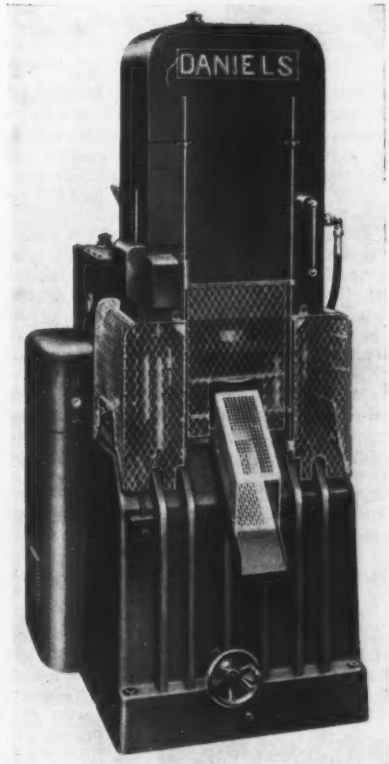


Fig. 4.—The Daniels 125-ton automatic hydraulic preforming press.

Education in Plastics Technology

Educational courses in plastics technology are now available at six technical colleges in Great Britain. These are all recognised by the Plastics Institute and cover the requirements of the Diploma and Associateship of the Institute. Regulations, syllabuses and other information concerning the Diploma, Associateship and Fellowship of the Plastics Institute may be obtained from the Managing Secretary, Adelphi, John Adam Street, London, W.C.2. Details of the individual courses are given below.

London: Acton Technical College

At the Acton Technical College, London, W.3, the courses include the chemistry and technology of plastics materials, and plastics machines and mould design. These courses are primarily designed for suitably qualified candidates who propose to take the Associateship of the Plastics Institute in the appropriate section. The section covering Plastics Machines and Mould Designs is of particular value to engineers who are engaged in industries connected with either the manufacture or the utilization of plastics materials. In addition to the normal laboratories, a plastics technology workshop will be opened in September next.

The two-year course on the Chemistry and Technology of Plastics Materials commences on September 18. This course deals with the higher chemistry and technology of plastics materials and is intended to cover the requirements of Section A of the Associateship Examination.

The two-year course on Plastics Machines and Mould Design includes the construction, principle and operation of machinery used in the plastics industry, together with mould design. This course will also include the Technology of Plastics Materials. It commences on September 18.

Further particulars regarding these courses can be obtained on application to Dr. J. H. Skellon, Head of Chemistry Department, Acton Technical College, High Street, Acton, London, W.3.

London: Borough Polytechnic

The courses at the Borough Polytechnic, London, S.E.1, are designed to prepare students for the Full Technological Certificate of the City and Guilds Institute and for the Diploma of the Plastics Institute.

The part-time day course is intended for apprentices and others who are released by their firm for one day a week. The course is held on Thursday of each week and normally requires attendance for a period of three years. Students whose general education is not up to the required standard may be required to attend for four years. This course commences on Thursday, September 27.

Evening courses are available for those who do not come under the scheme for part-time day release. The curriculum is the same as for the part-time day course, and normally requires attendance on three evenings a week. In special cases students may attend the classes in Plastics Technology only.

The course as laid down by the City and Guilds Institute and the Plastics Institute is as follows:—

First year: Chemistry, Physics or Engineering Science I, Mathematics I. Students holding the School Certificate in these subjects may be given exemption.

Second year: Chemistry II (Organic), Mathematics II, Engineering Drawing I.

Third year: Technology of Plastics, (i) Materials and Processes, (ii) Plant and Equipment, Electricity and Magnetism.

At this stage students normally sit for the Intermediate examination.

Fourth year: Technology of Plastics, (i) Materials and Processes, (ii) Plant and Equipment.

At this stage students normally sit for the Final Grade examination.

Enrolment for the courses takes place on September 19 and 20 for new students. Further information may be had on application to the Head of the Chemistry Department, Borough Polytechnic, Borough Road, London, S.E.1.

Birmingham: College of Technology

The College of Technology, Birmingham, offers full-time, part-time day and evening courses in Plastics Technology.

The full-time course for 1951-52 will extend over a period of two years, and a period of industrial training and experience is included. Preparation for the Associateship of the Plastics Institute, in either Section A (Chemistry) or Section C, is given by this course. Subject to the approval of the Board of Studies, the successful completion of the course will lead to the award of A.C.T. (Birmingham).

The part-time day course prepares students for the City and Guilds of London Institute Intermediate and Final examinations in Technology of Plastics. The complete course also gives full preparation for the Associateship of the Plastics Institute in either Sections A or C, and successful completion of the course will lead to the award of A.C.T. (Birmingham).

Evening classes are held in Technology of Plastics (Materials and Processes) and Plant and Mould Design.

The College has an exceptionally well-equipped laboratory for the study of plastics technology and contains pilot-scale and full-scale plant of varying types for the manufacture of synthetic resins and plastics materials, and for carrying out the usual shaping processes. Both chemical and physical examination of materials and products is undertaken. The laboratory is well fitted for the experimental study of fundamental and industrial problems.

Candidates for admission to the full-time course should apply to The Registrar, College of Technology, Suffolk Street, Birmingham, 1.

Inquiries referring to the part-time day and evening courses should be addressed to W. F. H. Dale, B.Sc., F.R.I.C., Senior Lecturer (Plastics Technology). Enrolment will take place during the week commencing Monday, September 10. The courses commence September 24.

Stroud: Stroud and District Technical College

The Stroud and District Technical College, Stroud, Glos, holds evening courses for the Diploma of the Plastics Institute and for the Associateship of the Plastics Institute.

The Diploma Course covers five years, for the first three of which students follow the National Certificate (Chemistry) course of the Inter. B.Sc. Science Course. During the last two years classes are arranged two evenings weekly on Mould Design and Plastics Technology.

Classes in subjects for the Associateship of the Plastics Institute are arranged as and when the demand arises.

The courses begin on September 24, and students may enrol from September 10. Further details about the courses may be obtained from the Principal's Office, Kendrick Hall, Kendrick Street, Stroud, Glos.

Manchester: Newton Heath Technical School

The Newton Heath Technical School, Newton Heath, Manchester, 10, holds part-time day plastics courses involving attendance on one day per week, and evening courses on three evenings per week. There is also a four-year course leading to the Intermediate and Final examinations of the City and Guilds of London Institute in Plastics Technology. From September next it is hoped to commence a further course leading to the Associateship examination of the Plastics Institute.

Further information relating to these courses are available from Mr. L. L. Roe, Head of Applied Science Department, Newton Heath Technical School, Newton Heath, Manchester, 10.

London: National College of Rubber Technology

During the 1951-52 session this college will offer a new full-time course in Plastics Technology. This course leads to the Associateship of the Plastics Institute (A.P.I.), and will normally take three years, but special short courses for graduates and others will be provided if there is sufficient demand.

Since the use of plastics in the rubber industry is increasing, and because from the point of view of scientific and technological education it is becoming increasingly difficult to separate plastics and synthetic rubbers, the full-time course in Rubber Technology at the N.C.R.T. is already supplemented by an evening course in Plastics Technology. This course, which may be attended by other students, leads to the award of the Certificate of the National College of Rubber Technology (C.N.C.R.T.). It also prepares the student for the City and Guilds of London Institute Examination in Plastics Technology, and so for the Diploma of the Plastics Institute.

The College has extensive workshops and laboratories, and provides a very complete course in practical work.

Prospective students for the A.P.I. examination are advised to make early application to the Head of the National College of Rubber Technology at the Northern Polytechnic, Holloway, London, N.7. Enrolment for evening and part-time courses will be on Monday, September 17, and Tuesday, September 18.

OBITUARY.—The directors of Crystalate, Ltd., regret to announce that Sir Herbert Morgan, K.B.E., chairman of the Company, died on July 4, 1951.

Successful Designing for Plastics Moulding—XXIII

By W. M. HALLIDAY

Further consideration is here given to the numerous design problems surrounding the coring of holes, etc., in the component, and how core plugs or kindred facilities may be most economically and advantageously incorporated in a mould construction. Special reference is given to the influence exerted by cores upon resultant accuracy, quality of surface finish, and relative freedom from flashing in the finished moulded article.

IN the previous article in this series, dealing with coring problems, three common and simple forms of core plug construction were considered, noting particularly the customary and preferred ways in which such mould elements may be mounted to promote accuracy, simplify operation of the mould, and/or to ensure maximum economies in its manufacture.

It will have been observed that these three forms of core design, i.e. the "straight-through," "landed" and "abutting," have two important features in common. For example, in each case illustrated, the respective core plug is located exactly at right angles to the main parting line joint of the mould, having a solid portion, interjecting into, or completely through, the cavity formation. In addition, each core plug illustrated is designed to reproduce a truly cylindrical hole in the wall of the moulded component.

The questions connected with the best location and mounting of core plugs will often constitute one of the chief problems to be considered by both produce and mould designers. These considerations will assume increased importance and complexity according to the degree of intricacy involved in the shape and form of the moulding. Thus a component having a large number of cored holes, some of which are not disposed so as to lie at right angles to the main parting joint surfaces of the mould, will usually present additional problems, and demand greater attention to core plug design generally.

As a general rule, the above-mentioned form of core location, i.e., that where the critical portion of the plug lies at right angles to mould parting, will usually prove the most economical and advisable for several important reasons, some of which have been briefly intimated in preceding sections. Other reasons are:

(1) The moulded component, whether produced as an injection or a compression moulding, may generally be ejected from the fixed core plug, or the latter extracted from the finished moulding, in the simplest and quickest manner, when the core can be disposed truly perpendicular to the main parting joint of the tool.

(2) Such ejection of component or core plug may be effected in the safest manner, thereby greatly minimizing the liability towards distortion, cracking or damage of the moulding, and cores.

(3) This will in turn ensure closer stability and uniformity of dimensions and shape in the finished article, and assist in promoting a long working life to cores.

(4) This form of core plug location will usually permit adoption of the simplest and therefore most economical mould constructions, which will be reflected in their speedier manipulation during use, and reduced initial cost of manufacture.

(5) Other factors being equal, it will also involve the minimum number of intersections and joint lines in the mould, resulting in a similarly small number of possible flash lines occurring on the surface of the finished component. Thus deflashing and trimming operations often will be simplified and their costs reduced.

(6) The simple form of core plug design and location of this kind will also involve the easiest toolmaking and machining operations, which moreover will be capable of being accomplished with closer precision. This, in turn, will give smoother working of the mould, longer life for critical component parts, and lessened maintenance attention.

When such type of core plug locafion can be used in conjunction with cylindrical parts to form holes in the moulding wall of that shape, the greatest economies may be expected. This will be due to the fact that cylindrical holes required in the mould blocks for mounting such cores, etc., will be the easiest to reproduce on account of the relatively simple machining and matching problems involved.

Cylindrical holes in the product can also be formed with the minimum of flash at the sides and ends, this being possible because of the greater ability of the toolmaker to ensure a perfectly close seal between the sides of the cylindrical core and the housing hole in the block.

Not all holes, however, have to be of this simple shape. It will often happen that a moulding is required to have a cored hole of polygonal cross-sectional shape, or it may even depart considerably from any standard regular shape, such as a square, hexagon, triangle or similar form. Holes of this kind can, of course, be cored quite effectively and, indeed, the ability to do so forms one of the chief advantageous features characterizing either plastics moulding process.

All kinds of hole shapes can be moulded, often with closer precision, greater economy, and usually in a manner wholly impracticable or prohibitive with any normal machining or cutting process.

It deserves to be realized, though, that when holes of other than cylindrical shape have to be cored in a plastics moulding, a greater degree of care has to be observed by both component and mould designers when determining their location and the disposition of the necessary cores in the mould.

Some of these problems occurring with the reproduction of non-cylindrical holes, and the various points to be guarded against, may best be explained and understood by considering an actual example.

Fig. 1 affords an interesting guide in this connection. The illustrations at A to the left show a portion of a component wall which is cored out with an octagonal-shaped hole, which has to pass completely through the part. It was important that the minimum amount of flash or fin be situated on the top and bottom edges surrounding the sides of this hole.

This component, moreover, was to be produced as an injection moulding, and the relevant core-plug design is shown at B. The core plug is situated fixedly in the movable block, the finished component being ejected by means of the usual push rods (not here illustrated). The bearing hole in the movable block for receiving the core is made octagonal in shape to suit the shank of the core plug.

The forming portion of the core projecting beyond the parting-line surface of the block is made appreciably longer than the thickness of the component wall to be cored, so that a short portion of the core may pass into a guide hole machined in the stationary mould block on the base of the cavity formation therein. Again, this guide hole is formed octagonal in shape, and the core has to be a close sliding fit therein.

With this construction, which is not to be recommended for any shape of core plug other than a truly cylindrical one, several important and undesirable features would doubtless arise, both during the course of mould manufacture and its later use

Referring again to diagram A, it will be observed that the octagonal hole is specified with eight perfectly sharp corners, necessitating corresponding sharp corners

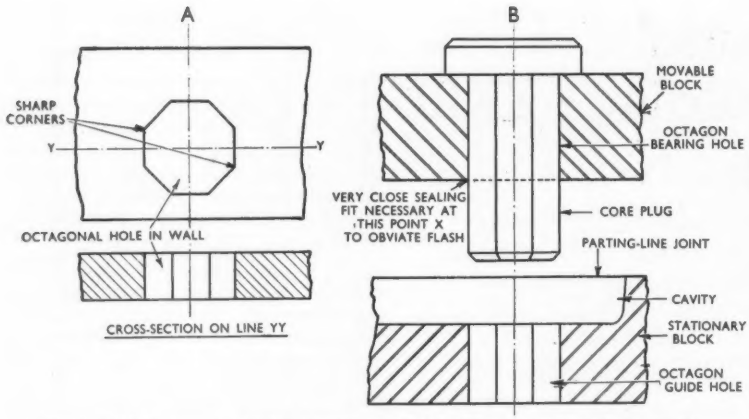


Fig. 1.—(A) Component having an octagonal hole through wall. (B) Undesirable core plug formation and mounting.

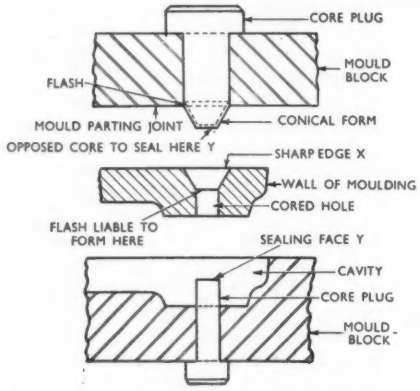


Fig. 2.—Preferred type of core design and mounting for producing component A (Fig 1.)

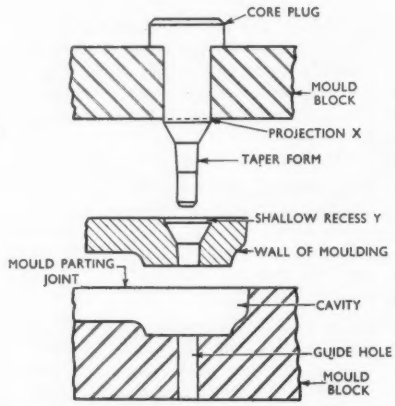


Fig. 3.—An "abutting" type core design, having certain disadvantageous features.

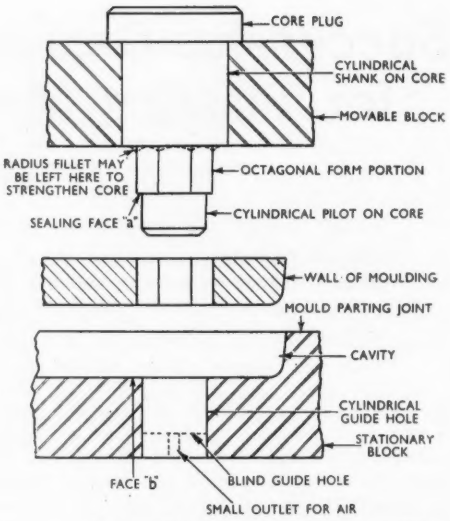


Fig. 4.—Core plug design and mounting for producing countersunk and counterbored holes.

on the critical sides of the core plug, and its bearing and guide holes in the respective mould blocks.

At the outset this would incur some considerable difficulty for the toolmaker. To reproduce such holes in the mould would require a special broaching or drifting tool, since sharp corners could not be obtained by using an ordinary cylindrical cutter in the milling, jig-boring or die-sinking machines after the usual manner of machining.

Having reproduced such a hole shape, complete with sharp corners, the toolmaker would next be confronted with the tricky task of fitting the shank and pilot portions of the core plug into their respective holes with the closest precision in order to ensure a material-tight seal along the eight corners, and especially at points X, situated on the parting-line surface of the movable block.

Any slight openings or crevices left at these points, if of a scale greater than about .002 in. with injection moulding, and about twice that amount with a compression mould, would result in a raised fin or flash being formed on the top and bottom edges of the hole in the component.

Any gross failure of the octagon core plug to seal off at the corners with its bearing hole or pilot hole would also mean that material would find ingress into such interstices, and entail a moulded hole of incorrect shape and size.

It would also be essential for the bearing and the pilot holes to be situated in exact axial alignment with each other, so that the mould blocks may be closed and opened in the smoothest manner. This would indeed be difficult to attain with a core plug made octagonal in shape for the whole of its length, as shown at Fig. 1.

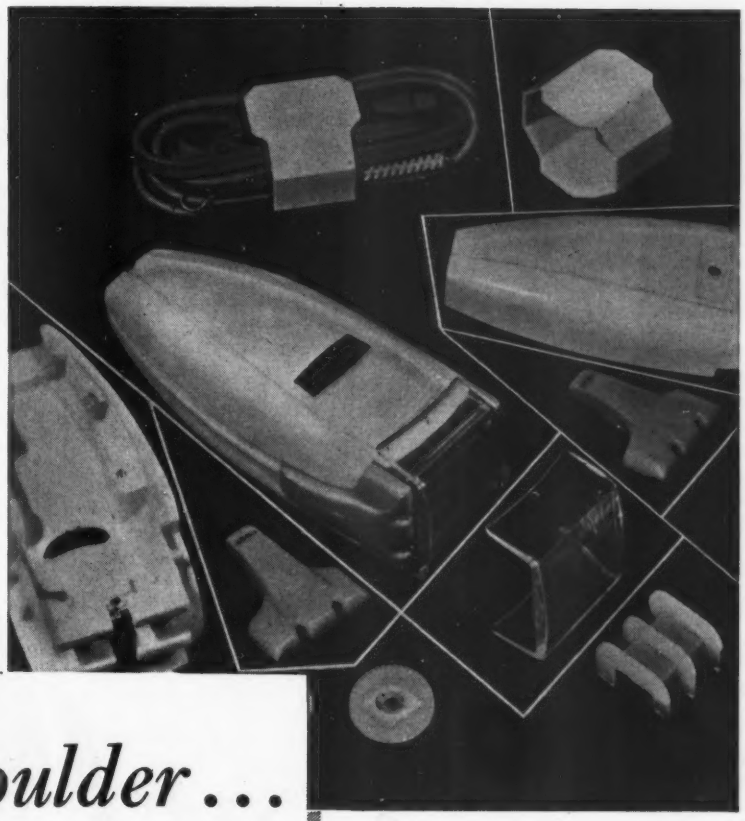
Further, with many types of moulded component the presence of acutely sharp corners of this kind might prove a source of weakness in the finished article, by reason of the increased tendency towards cracking, binding during ejection, and resultant distortion of the piece. This would be particularly apt to occur if the walls of the component were exceedingly thin and could not be stiffened by ribs or bosses.

If such a core-plug design were to be employed with a compression mould, additional troubles would ensue. In the first place, the core plug would have to be readily detachable from the bearing hole in the moving block, and thus the working clearance required, coupled with the aforementioned sealing or fitting discrepancies arising during mould machining and matching together, would result in additional flash being formed along the top and bottom sides of the component wall. Secondly, with certain stiff-flow powders, the critical octagon portion of the core plug intersecting the cavity would tend to become speedily deformed due to erosion of the sharp corners thereon. Abrasive mineral-filled powders would quickly act in this way on the sharp edges of the core.

Fig. 2 depicts a much more satisfactory and, indeed, economical form of core plug, location and installation, which will be largely free from the aforementioned objections. Referring to the upper sectioned view of the movable block of the injection mould, it will be observed that the headed core plug is provided with a cylindrical parallel shank, the diameter of which is made considerably greater than the across-corner dimension of the octagon hole to be reproduced.

The middle octagonal portion of the core plug is made octagonal in shape for a length exactly equal to the thickness of the wall being cored in the component. This dimension on the core must be determined with close precision to ensure that square shoulder "a" formed at the junction of the octagon portion with the lower smaller cylindrical pilot at the end of the core, will seat down closely upon the face "b" on the floor of the cavity in the opposite mould block.

The length of the large cylindrical bearing shank of the core must also be determined with exactitude, making it equal to the thickness of the movable mould block, so that the shoulder will lie level



The assembly illustrated entails the moulding (in quantity) of eleven components in no less than seven different plastic materials, both thermosetting and thermoplastic. The customer found it a great convenience to be able to employ one experienced and versatile firm for the multiple job. Mouldings by The Streetly Manufacturing Co. Ltd. for Remington Rand Ltd.

ask your moulder...

This is the second in a series of announcements designed to assist Buyers in purchasing plastics—moulded articles or components.

One point on which you will need assurance — all the more if you are a large consumer with a number of moulding contracts — will be the versatility of your moulder. The range of his equipment will interest you, not only because his ability to produce a good job at a good price may be influenced by it, *but also because it is a much simpler matter for you to deal with one moulder than with several.*

The question is tied up with the choice of materials, the nature of your jobs, the volume of output required. Can he, you ask, mould high-quality articles, large *and* small ? . . . can he mould in both thermosetting *and* thermoplastic materials ?

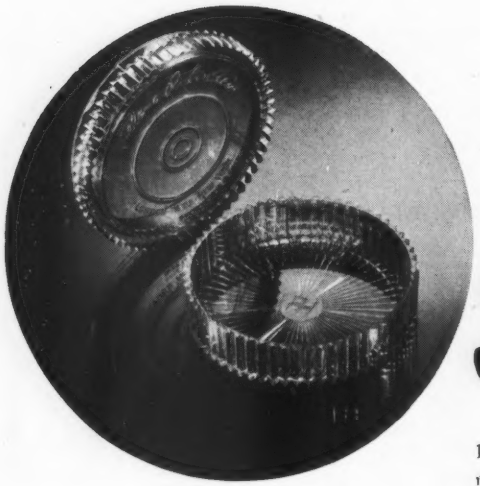
Many jobs could be carried out in any one of a number of materials. Others call for the use of different materials for different components. To a large extent your choice must depend on your moulder's advice. If it is to be worth having he must have had experience of all kinds of moulding materials and ideally he should be in a position to follow it himself — to mould almost any mouldable material. Check up on this essential aspect of service and choose only a moulder so experienced and equipped that he can offer you unbiased advice in this as in every other sphere of his work.

If in doubt, ask **STREETLY**

B·I·P GROUP

The Streetly Manufacturing Co. Ltd. makes mouldings in thermosetting or thermoplastic materials and specialises in long runs of highest quality mouldings. A high percentage of its regular output is of mouldings for manufacturers of electrical equipment and accessories. If you have a moulding job in view, call in Streetly for practical, down-to-earth advice.

THE STREETLY MANUFACTURING CO. LTD., STREETLY, SUTTON COLDFIELD, NR. BIRMINGHAM. Tel.: STREETLY 78411 Grams.: BANG STREETLY



Sparkle!

Distrene 80 has all the well-known attributes of standard polystyrene moulding materials—but, in addition, it possesses remarkable optical properties which enable it to give crystal-clear mouldings of exceptional sparkle and transparency.

Colour!

Distrene 200 is an improved form of polystyrene which besides giving, mouldings of extra toughness and heat resistance, is available in a full range of brilliant colours—including pastel shades, transparent tints and rich, opaque effects.

REGISTERED TRADE MARK

DISTRENE!

POLYSTYRENE INJECTION MOULDING MATERIALS

Write for a copy of the new Distrene Booklet to:—

BRITISH RESIN PRODUCTS LTD.

Sales and Technical Service, 21 St. James's Square, London, S.W.1. Tel.: Whitehall 8021-7

BRP

with the parting-line face of that block, as shown.

The diameter of the reduced cylindrical pilot at the opposite end of the core should be appreciably less than the across-flats dimensions of the octagon portion of the core.

With this form of core plug and method of mounting it in the mould blocks, the octagon hole would be formed completely through the wall of the component, as before, and the core would be guided and maintained in correct alignment in precisely the same manner.

From the angle of mould machining, general manufacture and cost, the method would show very considerable savings, because the two blocks would be dowelled together and held, closely fitting on their parting-line joint, whilst boring a housing hole for the core into both members simultaneously. This hole would be machined parallel to the diameter of the reduced pilot portion and would extend fully through both blocks.

After separating the blocks the movable member would be set-up again and the hole opened out concentrically to suit the diameter of the core shank. Thus, this form of machining would automatically take care of all hole alignments and would ensure formation of such housings in the speediest fashion.

The manufacture of the core plug itself would similarly be greatly simplified, since the critical octagon portion extends for only a relatively short distance, and the large-diameter cylindrical bearing part would serve excellently for mounting the member on the machine whilst fashioning the eight flats.

Most important of all, no difficult or exacting fitting or sealing problems would arise when installing this core plug in the mould, since at no point in its engagement with either mould block would an octagonal hole have to be contended with, in the way arising with the previous example.

If it should prove essential to core the hole in the wall of the part with perfectly sharp corners, this would be much more easily achieved with the core design B, ensuring a minimum of flash formation, or later maintenance troubles, because of the elimination of the octagon holes in the mould blocks.

In the case of a hole of very small size required to this octagonal shape, to avoid weakening the core plug unduly when machining the critical shape, and in its ability to withstand flow pressures, an ample radius fillet may be provided at juncture of the octagon portion with the large, round shank, as denoted by heavy broken lines on diagram B.

This would also prove of some assistance in improving the appearance of the finished moulding, and would simplify flash removal at that point. The introduction of a small, rounded lead at the mouth of the hole would also, in numerous instances, be found helpful to facilitate the engagement of the mating component required in conjunction with the moulding.

With injection-type moulds, it would often prove beneficial to employ a blind hole in the stationary mould block for insertion of the cylindrical pilot. Such a hole is denoted in diagram B by heavy, broken lines in the lower view. This would diminish the tendency towards accidental leakage of material out of the cavity area along the sides of the pilot portion, especially when some degree of wear has occurred on the sides of that member.

In the case of a compression mould, such a core-plug design would be considerably superior to that shown in the preceding example, because the core would have to be a sliding fit in its bearing hole in the upper (moving) face so that it could be extracted out of the moulding. Thus a smoother action would be derived by using a cylindrical shank, which would require a smaller amount of working clearance than would be feasible with the octagon shape already described.

Countersunk Holes

Fig. 3 illustrates another very common coring requirement which will frequently arise with a plastics moulded component. This refers to the formation of countersunk or counter-bored type holes formed in the wall of a component.

The middle-sectioned view shows the relevant portion of the wall of an injection moulding which has to be cored with a hole for a fixing screw. The upper portion of this hole is countersunk 60 degrees included angle concentric with the remaining portion, for a standard vee-head screw.

The upper and lower views, giving partial sections of the movable and stationary mould blocks depict one unsatisfactory form of "abutting" type core-plug mounting, with which several disadvantageous features would arise.

As will be observed, two core plugs are adopted to form a hole of this shape. The part forming the conical portion of the hole is contained in the movable block, this being mounted in a plain cylindrical bearing hole through that block. The diameter of this bearing hole, and shank of plug is exactly the same as the maximum diameter of the conical part of the plug impinging into the mould cavity. The second core plug is a fixture within a parallel cylindrical bearing hole in the stationary block, and the portion of the plug passing into the cavity area is parallel.

With this construction the two core plugs will have to seat down very closely on end faces Y—Y when the mould blocks are in the closed (injecting) position, otherwise a flash would occur at that point in the hole.

Certain toolmaking objections would arise in locating the conical core plug in the movable block. This would have to be carefully determined to ensure that the maximum diameter of the conical form lies exactly level with the parting line surface of the block, as depicted. Should this point inadvertently be situated below the parting-line surface, as shown by light dotted line, a raised flash would then be formed around the edge of the hole in the moulding.

The sharp razor edges necessary on the tip of the conical core plug and the flat end face of the parallel ditto would also be liable to suffer damage during working of the mould, due to normal abrasion and drag occurring between plastic material and those portions of plugs. The drag arising from ejection of the contracting component would also aggravate such tendency, and repeated correction of these surfaces of the cores would be involved to keep flashing at a minimum.

From the point of view of the component, a countersunk hole of the kind shown at Fig. 3, would be unsatisfactory. The conical portion is formed with a perfectly sharp edge at the mount. This will often prove a source of some trouble when assembling the fixing screw in place, especially if slight variation should occur in the height of the head of the screw.

A much more satisfactory core-plug design is shown at Fig. 4, which employs a single core of the "straight-through" type. This plug is mounted in the movable mould block, within a parallel cylindrical bearing hole. This parallel portion is allowed to project beyond the parting-line surface of the block as shown at X so as to produce the shallow recess at Y at the mouth of the conical hole in the wall of the moulding. The depth of this straight portion should be approximately 0.012 in. for small-size holes, i.e., those up to about $\frac{5}{16}$-in. diameter, and about 0.20 in. for larger holes.

The front portion of the core plug having to pass through the cavity in the stationary block is made long enough to engage the parallel guide hole formed in that member, thereby ensuring a useful pilot for maintaining the plug in correct alignment. The middle portion of the core for forming the straight part of the hole has a slight side taper to ease ejection.

This kind of core-plug construction and mounting will be relatively free from the several objections noted with the previous example Fig. 3, and it will be found particularly useful and economical when moulding holes of small diameter or considerable length, whose reproduction would necessitate a slender core of delicate proportions and appreciable weakness. *(To be continued)*

PATENT REVIEW

The following abstracts have been made from specifications at the Patent Office, with the permission of the Controller of H.M. Stationery Office. Complete specifications can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 2/- each.

B.P. 651,560. Appl. 12.8.48. Acc. 4.4.51.
Manufacture of copolymers from vinyl compounds. R. S. Robinson. To: Beck, Koller and Co. (England), Ltd.

Surface coating compositions based on copolymers of styrene and vinyl compounds. See also B.P. 651,560.

B.P. 651,662. Appl. 1.6.48. Conv. (U.S.A.) 11.6.47. Acc. 4.4.51.
Cellulose derivative compositions. To: **British Celanese, Ltd.**

B.P. 651,694. Appl. 3.12.48. Acc. 4.4.51.
Production of coloured filaments and fibres. E. Waters and L. Wood. To: I.C.I., Ltd.

Manufacture of coloured filaments from polyethylene terephthalate. Colouring matter is added to the spinning solution, and the material can be spun in various colours.

B.P. 651,696. Appl. 4.12.48. Acc. 4.4.51.
Cloths for filter press. E. S. Heath and W. S. Heath.

Use of a nylon filter cloth in a filter press backed (to give it rigidity) by an open mesh textile which may consist of polyvinyl chloride fibre.

B.P. 651,715. Appl. 23.12.46. Conv. (U.S.A.) 14.6.46. Acc. 11.4.51.
Apparatus for shaping sheet thermoplastic material centrifugally. To: Goodyear Aircraft Corp.

Rotating device for centrifugal moulding of thermoplastic sheet material, in particular methyl methacrylate sheet. The weight of the mould is counter-balanced by adjustable weights. Heated sheets are inserted into the mould and formed into the shape of the mould by centrifugal force.

B.P. 651,762. Appl. 29.4.49. Acc. 11.4.51.
Production of polymeric esters. F. Reeder and E. R. Wallsgrove. To: Courtaulds, Ltd.

Refers to production of polymeric esters based on condensation of hydroquinone bis (beta hydroxyethyl) ether.

B.P. 651,769. Appl. 30.8.48. Conv. (U.S.A.) 25.6.48. Acc. 11.4.52
Vinylidene chloride interpolymers as coatings for regenerated cellulose film. To: British Cellophane, Ltd.

B.P. 651,482. Appl. 29.7.47. Conv. (U.S.A.) 20.2.43. Acc. 11.4.51
Shaping laminated phenolic resin-impregnated sheet material. Raybestos-Manhattan, Inc.

Method of shaping a laminated material consisting of a fibrous sheet impregnated with a C-stage resin and forming the laminate between heated metal surfaces at a temperature between 275 and 300 degrees F.

B.P. 651,855. Appl. 28.11.47. Conv. (U.S.A.) 29.11.46. Acc. 11.4.51
A process for coating cellulose proprionate articles and materials. To: British Celanese, Ltd.

Application of a cellulose nitrate/aliphatic alcohol mixture to the surface of propionate sheet in order to render the surface blush-resistant.

B.P. 651,873. Appl. 10.3.48. Conv. (U.S.A.) 26.3.47. Acc. 11.4.51
Aminotriazine-aldehyde resins. R. Lindenfelser. To: British Industrial Plastics, Ltd.

B.P. 652,012. Appl. 18.8.48. Conv. (U.S.A.) 25.8.47. Acc. 11.4.51
Solutions of acrylonitrile polymers. To: American Viscose Corp.

Solutions of acrylonitrile polymer in a medium which is not a swelling agent for the polymer, e.g., nitro-methane and formic acid or dichloro-acetic acid and others.

B.P. 652,024. Appl. 25.11.49. Acc. 11.4.51.
Production of thermoplastic resins and of threads, fibres, filaments and the like products therefrom. A. S. Carpenter, E. R. Wallsgrove and F. Reeder. To: Courtaulds, Ltd.

B.P. 652,057. Appl. 13.5.48. Acc. 18.4.51.
Compositions containing polymethyl methacrylate. V. E. Yarsley. To: Kemball, Bishop and Co., Ltd.

An increase in tensile strength of the polymer is obtained by incorporating lower alkyl itaconic esters in the polymeric methyl methacrylate composition.

B.P. 652,159. Appl. 24.7.47. Conv. (U.S.A.) 20.2.42. Acc. 18.4.51.
Method of heat sealing thermoplastic sheet materials. To: Shellmar Products, Ltd.

Heatsealing of thermoplastic sheet materials by immersing them in a bath of a liquid at suitable temperature, e.g., a bath of molten metal, until the heatsealing temperature is obtained.

B.P. 562,290. Appl. 24.2.48. Conv. (U.S.A.) 8.5.40. Acc. 18.4.51
Method of making and filling tea bags, coffee bags and the like. To: Pneumatic Scale Corp.

Machine for automatic forming of tea bags, etc., from a continuous web (which may be a thermoplastic material) filling the bags and marginally sealing them after filling by application of heat or by an adhesive.

B.P. 652,360. Appl. 5.2.47. Conv. (Germany) 30.12.41. Acc. 25.4.51.
Hydraulically operated injection moulding presses. V. Vltavsky.

Hydraulic-type transfer moulding press, having a vertical cylinder which is used to transfer the plastic material into the mould, which is closed by means of a horizontal hydraulic press suitably inter-connected with the ram of the vertical press.

B.P. 652,413. Appl. 14.1.48. Acc. 25.4.51.
Extrusion devices. R. Lipscomb. To: Imperial Chemical Industries, Ltd.

Refers to the design of extrusion dies for the manufacture of plastic tubing.

B.P. 652,420. Appl. 11.2.48. Conv. (U.S.A.) 24.12.46. Acc. 25.4.51.
Processes of producing surface coating resins and the surface coating resins resulting from said processes. M. J. Scott. To: Monsanto Chemical Co.

B.P. 652,526. Appl. 10.12.48. Acc. 25.4.51.
Injection moulding apparatus. To: Lester Engineering Co.

High-pressure injection moulding machine (working pressure 20,000 to 30,000 p.s.i.) with intermediate pressure cylinder from which the mould is filled.

B.P. 652,541. Appl. 11.8.48. Acc. 25.4.51.
Production of articles of thermoplastic material. A. M. Hytch. To: Dunlop Rubber Co., Ltd.

Welding of thermoplastic sheet material in predetermined shape by passing the material together with a shaped metal electrode over a conveyor belt and between pressure rollers which are connected to a source of High Frequency current.

B.P. 652,543. Appl. 28.8.47. Acc. 25.4.51.
Manufacture of cellulose esters. To: British Celanese, Ltd.

Refers to production methods for the manufacture of lower aliphatic esters of cellulose, in particular, cellulose acetate.

B.P. 652,557. Appl. 21.9.48. Acc. 25.4.51.
A process for moulding and vulcanizing compounded elastomers. J. G. Fife. Comm. from Dow Corning Corp.

Refers to vulcanization of synthetic rubbers, in particular GR-S types.

B.P. 652,669. Appl. 23.7.48. Conv. (U.S.A.) 18.9.47. Acc. 25.4.51.
Plastic compositions. To: Diamond Alkali Company.

Refers to flame-proofing of thermoplastic moulding materials by using a highly chlorinated organic substance, an inorganic flame retardant substance and a stabilizer for the chlorinated material.

B.P. 652,730. Appl. 31.12.48. Acc. 2.5.51.
Methods for improving the resistance of polyethylene or polyethylene-containing materials to ultra-violet light. C. W. Buckles and C. F. Williams. To: Pirelli-General Cableworks, Ltd.

Incorporation in the polythene of a substance with a strong absorption spectrum in the ultra violet light region, e.g., naphthalene, anthracene, fluorene, etc.

B.P. 652,757. Appl. 8.3.48. Conv. (C.S.R.) 17.3.47. Acc. 2.5.51
Methods and apparatus for the vulcanization of plastic materials To: Bata Narodni Podnik.

High frequency dielectric heating used for the vulcanization of plastic materials by subjecting them to the heating action of a dielectric field.

B.P. 652,790. Appl. 6.4.49. Acc. 2.5.51.
Manufacture of pipes, conduits, electric cable sheaths and the like. A. N. Arman. To: Pirelli-General Cable Works, Ltd.

Refers to the covering of an aluminium cable sheath with an extruded plastic coating for protective and insulating purposes.

B.P. 652,801. Appl. 11.6.48. Acc. 2.5.51.
Plastic compositions of a putty-like nature. L. E. Puddefoot and F. C. Allen. To: B.B. Chemical Co., Ltd.

Books Received

"Aminoplastics." By C. P. Vale. London: Cleaver-Hume Press, Ltd. 12s. 6d.

"Exhibition Design." Edited by Mischa Black. London: Architectural Press. 25s.

"Rubber Trade Directory of Great Britain, 1950." Maclaren and Sons, Ltd. 63s.

"Paint Film Defects" by Manfred Hess. London: Chapman and Hall, Ltd., 50s.

"France-Plastiques" Year Book, 1951. Paris: Créations Editions Productions Publicitaires.

COLOUR BY *Courtaulds* LIMITED

CELLULOSE ACETATE MOULDING POWDER

EXTRUDED PRODUCTS

TRANSPARENT FILM

PLASTICS DIVISION: Little Heath, Coventry. Tele: Coventry 88031. 16 *St. Martins-le-Grand, London, E.C.1. Tele: Monarch* 8811

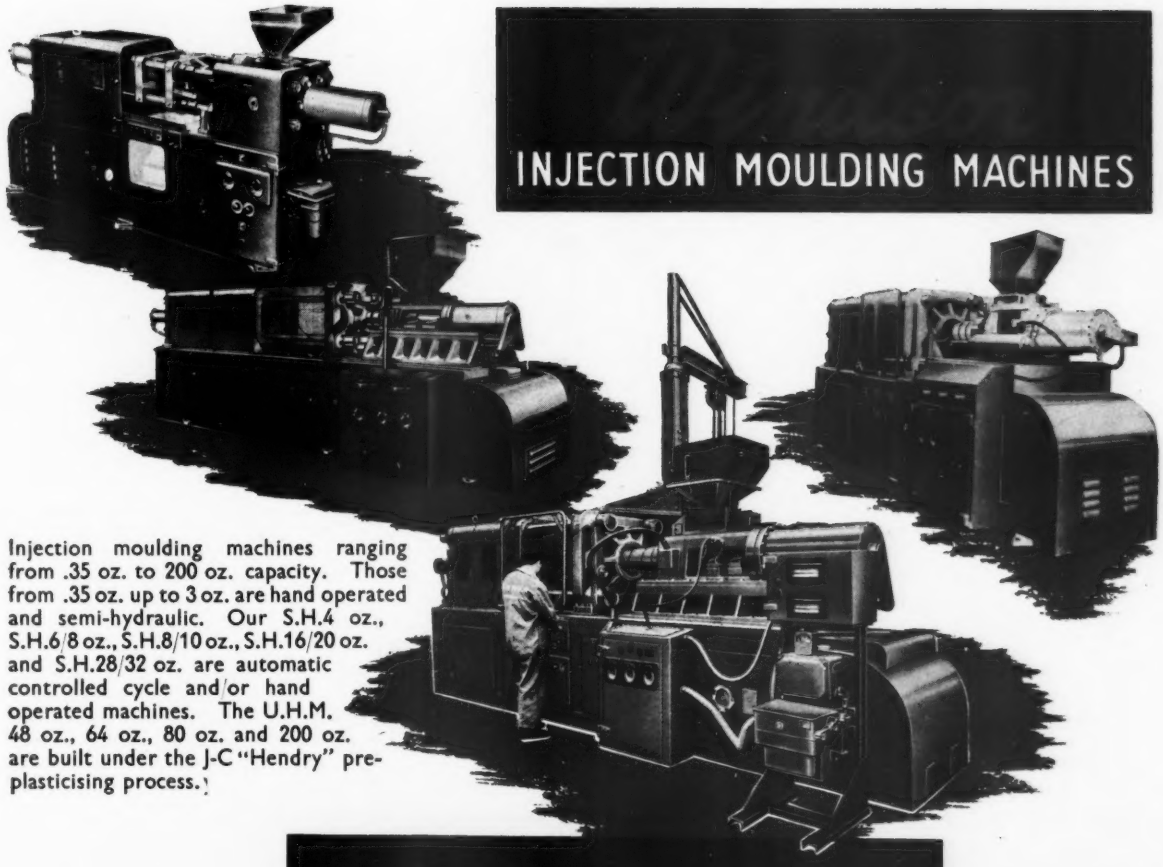
Rely on

STYRON

POLYSTYRENE
GRANULES

R. H. COLE AND COMPANY LIMITED
2, CAXTON ST., WESTMINSTER, LONDON, S.W.1.
'PHONE: ABBEY 3061 (10 LINES). 'GRAMS: GERATOLE, PHONE, LONDON.

Product of Dow Chemical of Canada Ltd



INJECTION MOULDING MACHINES

Injection moulding machines ranging from .35 oz. to 200 oz. capacity. Those from .35 oz. up to 3 oz. are hand operated and semi-hydraulic. Our S.H.4 oz., S.H.6/8 oz., S.H.8/10 oz., S.H.16/20 oz. and S.H.28/32 oz. are automatic controlled cycle and/or hand operated machines. The U.H.M. 48 oz., 64 oz., 80 oz. and 200 oz. are built under the J-C "Hendry" pre-plasticising process.

EXTRUSION MACHINES

World Distributors of "CHANDOS" Rotary Dryer and Pre-heater

Our range consists of multi-screw machines built under L.M.P. principles in R.C.65 lb., R.C.100 lb. and R.C.200 lb. capacities respectively. The multi-screw extruders being well known for their efficient compounding, mixing and uniform extruding qualities.

SERVING THE WORLD'S PLASTIC INDUSTRY
Windsor
PLASTIC MACHINES
TRADE MARK

R. H. WINDSOR LTD.
16 FINSBURY SQUARE, LONDON, E.C.2
Phone: MONarch 8722 Cables: TECHNIMACH, LONDON
Grams: TECHNIMACH, FINSQUARE, LONDON

MAKERS OF MOULDS, DIES AND ANCILLARY EQUIPMENT

The MASSON ROTARY CUTTER for

UNIFORM GRANULATION
OF ALL KINDS OF PLASTIC MATERIALS
AND SYNTHETIC RUBBER.

Any desired degree of fineness with minimum of dust.

Low H.P. • High Output • Made in five sizes.

BLACKFRIARS ROTARY CUTTERS LTD.
BLACKFRIARS HOUSE, NEW BRIDGE STREET, LONDON, E.C.4. Telephone: Central 6383

NYMOL *is a Trade Name denoting precision Engineering Components produced from* NYLON

by

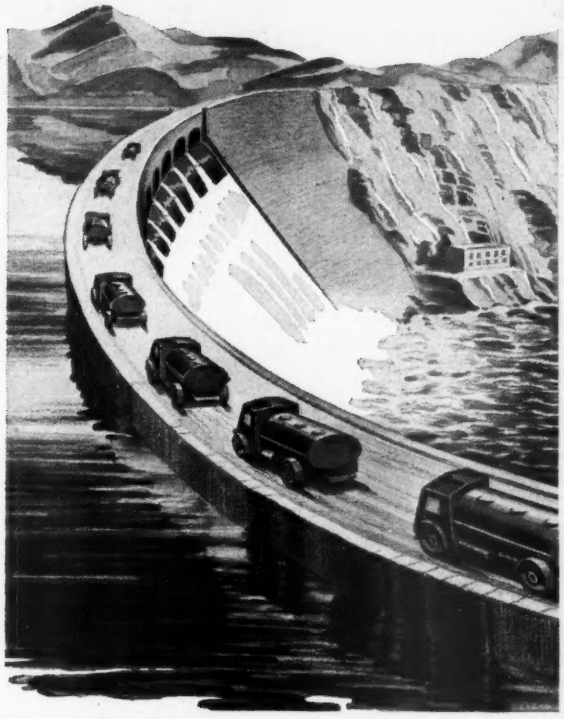
Plastic Engineers Limited

Treforest Trading Estate • Pontypridd • Glamorgan

Telephone: TAFFS WELL 271

★ *DESIGNERS are invited to consult the manufacturers concerning the engineering applications of NYLON—The material which does a better job.*

Maintaining a constant rate of flow



A very efficient organisation and a large fleet of powerful tankers are necessary to keep Synthite Formaldehyde flowing smoothly to big users all over the country.
Our two plants, one in Wales and the other in the industrial heart of England, are equipped to handle many millions of gallons of Formaldehyde annually; every drop of which is carefully tested before delivery.

WATER WHITE

40% *by Volume*

Free from Deleterious Matter

FORMALDEHYDE 100% S BRAND SYNTHITE LTD

SYNTHITE Formaldehyde

Manufactured by Synthite Ltd., West Bromwich, Staffs.
A MEMBER OF THE TENNANT GROUP OF COMPANIES.
Selling Agents: Barter Trading Corporation, 14 Waterloo Place, London, S.W.1.

By Order of the Receiver, Henry Peat, Esq., F.C.A.

METROPOLITAN PLYWOOD CO., LTD.,
Leonard Street, City Road, London, E.C.2

MODERN
PLASTIC BOARD
AND
PLYWOOD PLANT

Including:

Plastic Board Machinery, viz., Hydraulic Tilting Mixers up to 600 lbs. capacity by Baker Perkins, etc.; Nos. 3 and 4 "Super" Miracle Mills; "Dryad" 21-ft. Hotplate Travelling Dryer; Petrie 88 in. by 60 ft. Continuous Dryer; Electric H.F. Drying Units, Locker Sifters; Sawdust Screening Plant, Redler Conveyors, etc.

Plywood and Veneer Plant by Berry, Pickles, Diehl, etc., viz., Veneer Presses, 12 daylight; Power Guillotines to 6 ft. wide; Veneer Edge Jointers, 112-in. Veneer Joint Edge Planer; Tape Edge Jointers; Glue Spreaders and Mixers, etc.

Joinery Plant by Robinson, Wadkin, White and others, viz., Trenching, Crosscut, Dimension and Band Saws, Double and Vertical Crosscut Saws, Straight Line Edgers; Spindle Moulders, Panel and Surface Planers; Belt and Disc Sanders; Routers; Saw Doctoring Equipment, etc.

Sheet Metal Machinery, viz., Power, Hand and Treadle Guillotines to 6 ft. wide; Universal Folders and Benders; Bench Folders; Circle Cutters; Swagers; Electric Pedestal Drills; "Abrasaw" Abrasive Saw, Hacksaws, etc.

Miscellaneous, viz., Vertical Steam Boilers; Autoclaves; Engineers' Machine Tools; Electric Portable Tools; Spraying and Welding Plant; Electric Compressor Sets; Gravity Roller Conveyor; Scales, Electric Hoist Blocks.

200 tons Composition Board

Transport, viz., Mobile Cranes, Forklift Trucks, Factory Petrol Trucks; Clark Trucktractors and Lo-Load Trailers; Lorries and Private Cars.

Office Equipment, viz., Electric Accounting Machines; Comptometer and other Calculators; Electric and other Typewriters; Duplicators, Mahogany and Oak Desks, Safes; Drawing Office, Laboratory and Canteen Equipment.

LEOPOLD FARMER & SONS
will sell the above
BY AUCTION
at
Winchester House, Old Broad St., London, E.C.2
In September, 1951

On View One Week Prior to Auction

Catalogues of Henry Peat, Esq., F.C.A., of Messrs. Peat, Marwick, Mitchell & Co., Chartered Accountants, 11, Ironmonger Lane, London, E.C.2, and Messrs. Leopold Farmer & Sons, Industrial Property, Plant and Machinery Auctioneers, 46, Gresham Street, London, E.C.2. Telephone: MONarch 3422.

Mouldings that matter

Our long experience in the design and production of intricate precision mouldings ensures that these moulded bobbins, for use on knitting machines, reach an unusually high degree of strength, uniformity and finish.

Difficult mouldings of this nature can safely be left to Kent Mouldings.

These bobbins are supplied to I. L. BERRIDGE & CO., LEICESTER, for use on their knitting machines.

KENT MOULDINGS

PROPRIETORS: KOLSTER BRANDES LIMITED

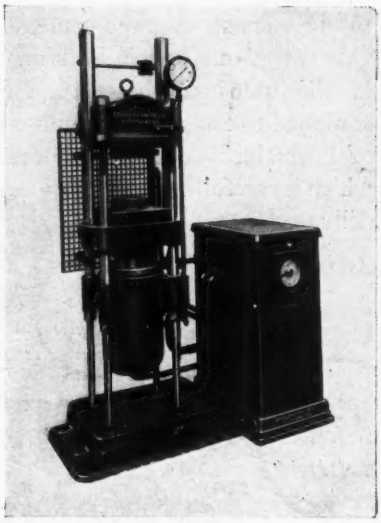
FOOTSCRAY KM SIDCUP, KENT

Telephone: Footscray 3333

Telegrams: Kolster, Phone Sidcup

PLASTIC MOULDING EQUIPMENT

PRESSES
PUMPS
ACCUMULATORS
PELLETING MACHINES
AUTOMATIC CONTROL UNITS
VALVES & FITTINGS



No. 201A. 25-ton Press with Automatic Control Unit

BRADLEY & TURTON LIMITED

CALDWALL WORKS, KIDDERMINSTER
Phone No.: 2217/8
Grams: "Wheels" Kidderminster

114 HAMSTEAD ROAD, HANDSWORTH, BIRMINGHAM 20
Phone No.: NORthern 2519

ESTABLISHED 1831

Examples of our many activities. The pump impeller is a Panilax Resin Moulding and is supported upon rolls of Mica tape and Empire tape. The punchings include Micanite, Paxolin Laminated and Mica.

m and i

THE MICANITE & INSULATORS CO. LTD

EMPIRE WORKS · BLACKHORSE LANE · WALTHAMSTOW · LONDON · E.17

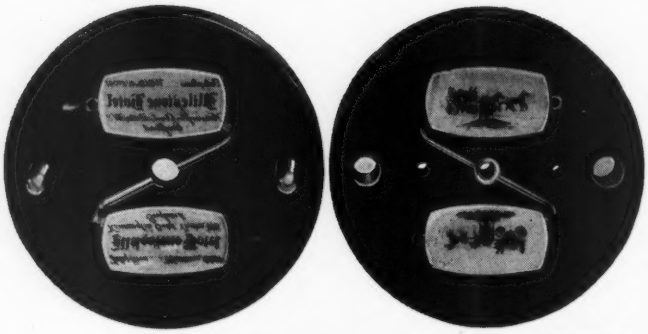
BRANCH OFFICES at BIRMINGHAM • CARDIFF • GLASGOW • MANCHESTER and NEWCASTLE-UPON-TYNE and representatives in most countries throughout the world.

Manufacturers of MICANITE (Built-up Mica Insulation). Fabricated and Processed MICA. PAXOLIN Laminated Materials. PANILAX Laminated Materials and Mouldings. EMPIRE Varnished Insulating Cloths and Tapes. HIGH VOLTAGE BUSHINGS & TERMINALS.
Distributors of Micoflex-Duratube Sleevings, Micoflex-Durasleeve (Plastics-covered flexible metal conduit) and Kenutuf Injection Mouldings (P.V.C.)

Prototypes to Production

PIGNON LIMITED

DIE SINKING, ENGRAVING
MOULD MAKING



By courtesy of INJECTION MOULDERS Ltd.

PIGNON PLASTICS LIMITED

COMPRESSION and INJECTION MOULDINGS

BRYANTWOOD WORKS, BRYANTWOOD ROAD,
HOLLOWAY, LONDON, N.7. Telephone: NORth 1326.

TRADE MARK T&N

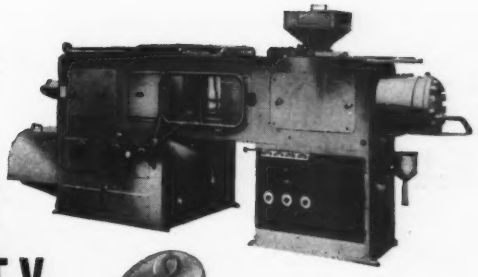
T & N Corrugated Fibreboard Cases and Corrugated Packaging are used extensively for export and home packaging of:—

FOOD AND CONFECTIONERY • WINES AND SPIRITS
ELECTRICAL GOODS • RADIO • MOTORING REQUISITES
CHINA, GLASS, HARDWARE • PAINT • PROPRIETARY
CHEMICAL PRODUCTS • LEATHER GOODS • BOOKS
FOOTWEAR • FRESH FRUIT AND CUT FLOWERS, ETC.

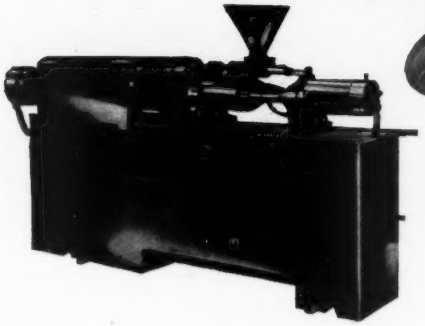
THOMPSON & NORRIS
Pioneers of Corrugated Packaging

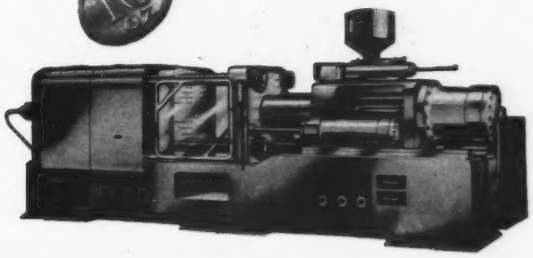
THE THOMPSON & NORRIS MFG. CO. LTD.,
Great West Road, Brentford, Middlesex.
Telephone: EALing 4555

FACTORIES ALSO AT CORSTORPHINE, EDINBURGH · SHIRLEY, BIRMINGHAM · HISTON, CAMBS. · WARRENPOINT, CO. DOWN.



HIGH PRODUCTIVITY
Through Maximum Efficiency





PECO Injection Moulding Machines

The Projectile & Engineering Co. Ltd. manufacture a range of Injection Moulding Machines from 2 oz. to 16 oz. capacity, designed to meet the most exacting requirements of the Plastic Industry. They are self-contained with automatic cycle, and hydraulically operated. They have a high plasticising capacity and rate of injection. Mould-locking pressure and platen area enable them to operate at a high rate of production.

MOULDS

PECO MOULDS. Expert Designers and mould makers are employed and moulds can be supplied to samples submitted, including die-sinking models if desired. An important side of the Company's work is the hobbing of cavities for moulds and medallions — the plant includes a 3,000-ton Hobbing plant. Master hobs to customers' samples made as required.

Full particulars of our range of Injection Moulding Machines and Moulds will be sent on request.

PECO PROJECTILE PRODUCTS

The PROJECTILE & ENGINEERING
COMPANY LIMITED

ACRE STREET, BATTERSEA, LONDON, S.W.8, ENGLAND

Telephone: Macaulay 1212 Telegrams: "Profectus, Claproad, London" Cables: Profectus, London

PLASTICS MACHINERY

288-ton Upstroke Hyd. Press by JOHN SHAW. Working space 3 ft. 6 ins. × 2 ft. Daylight 1 ft. 11 ins. Hele-Shaw pumping equipment.

250-ton Upstroke Hyd. Press. Working space 2 ft. 6 ins. × 1 ft. 2 ins. Daylight 1 ft. 2½ ins. W.P. 1 ton.

225 - ton Downstroke Hyd. Presses by BRADLEY & TURTON. Working space 3 ft. × 3 ft. Daylight 3 ft. 4 ins. W.P. 1 ton.

120-ton Upstroke Hyd. Press by DAVID BRIDGE. Working space 2 ft. 6 ins. × 2 ft. 6 ins. Daylight 1 ft. 4 ins. Head and table cored for steam heating. W.P. 1,500 lb.

100-ton Downstroke Hyd. Presses by BRADLEY & TURTON. Working space 1 ft. 9 ins. × 1 ft. 8 ins. Daylight 2 ft. 3 ins. W.P. 1 ton.

75 - ton Downstroke Hyd. Presses by BRADLEY & TURTON. Working space 1 ft. 6 ins. × 1 ft. 5 ins. Daylight 1 ft. 8 ins. W.P. 1 ton.

70-ton Downstroke Hyd. Press by JOHN SHAW. Electric platens 1 ft. 4¾ ins. × 1 ft. 2 ins. Daylight 11 ins. W.P. 2,000 lb.

New 50-ton 'COBORN' Downstroke Hyd. Presses. Electric platens 1 ft. 5 ins. × 1 ft. 4 ins. Daylight 9¾ ins. Vickers' pumping equipment.

E.M.B. 4-oz. Injection Moulding Machine. No. 9B. Type 82.

COVERLEY - KENDALL Radio Frequency Pre - heater. Capacity 1 lb. powder in 1½ mins. at 105°C. Fully automatic.

Model P2 Pelletting Machines by BRADLEY & TURTON. Maximum size 1¾ ins. dia. × ½ in. Output 35 per min.

Rotary Pelletting Machines by WORSSAM. 15 sets punches and dies 1½ ins. × 1½ ins.

Single Punch Pelletting Machine by WALKER. Maximum size ¼ in. dia. × ¾ in.

Single Punch Pelletting Machine by WALKER. Maximum size ½ in. × ½ in.

Single Punch Pelletting Machine by WILKINSON. Maximum size $\frac{9}{16}$ in. × ½ in.

Single Punch 'MANESTY' Type Pelletting Machine. Maximum size ⅞ in. × ⅜ in. Motorized 350/440/3/50.

'COURTOY' Tabletting Machine by THOMPSON & CAPPER. Fitted multi-impression tool to produce eight ½ in. dia. tablets per stroke. Motorized 400/3/50.

'MANESTY' No. 3 Tabletting Machine. Fitted multi-impression tool to produce eight ½ in. dia. tablets per stroke. Motorized 400/3/50.

GEORGE COHEN SONS & CO. LTD

WOOD LANE, LONDON, W.12 & **STANNINGLEY, NR. LEEDS**

Tel.: Shepherds Bush 2070 **Tel.: Pudsey 2241**

THE 600 GROUP OF COMPANIES

P/516/HP9

Moulds by Experts.

Injection Mould for 10½" Sleeping Doll with movable head, arms and legs.
Material — STYRENE.

Specialists in
MOULDS
FOR PLASTICS

★ H.B.SALE LTD.

PROGRESS WORKS, SUMMER LANE, BIRMINGHAM, 19

Established 80 years. TEL. : CEN 5661/3 GRAMS. : SALE, B'HAM Member of G.T.M.A.

THE SECRET OF THE
REAL MIX

2·1 TURNING RATIO

SCIENTIFICALLY DESIGNED INTERMESHING BLADES

THE BEKEN SYSTEM ensures the only TRUE mix and TRUE mixing implies complete dispersion. For example, the compounding of P.V.C. with pigments and fillers, ready for the sheeting rolls, is one of the many ways by which the Beken Duplex Mixer cuts production time and costs.
Almost every mixing or dispersion problem can be simplified by using BEKEN MIXERS. May we give you a demonstration with your materials?

BEKEN DUPLEX MIXERS

This Beken System is applied to a wide range of machines, so why not write for further details now.

Sole Distributors LAVINO (LONDON) LTD. 103 KINGSWAY, LONDON, W.C.2
Sole Makers E. HUNT & CO., LTD. RIPPLE ROAD, BARKING, ESSEX

All connected

with the production or application of plastic materials will find in these books a wealth of valuable information to which they will refer again and again.

THE THEORY OF POLYMERIZATION

By H. R. Fleck **Price 10/6**
11s. by post

A manual written specially for students working in the plastics industry, which deals with the most fundamental and difficult section of the chemistry of plastics.

145 pp.

PLASTICS MANUAL

By H. R. Fleck **Price 15/-**
15s. 6d. by post

The most comprehensive reference book obtainable, providing information on the materials used in the plastics industry.

155 pp.

MOULDS FOR PLASTICS

By W. M. Halliday **Price 30/-**
30s. 6d. by post

An aid to Toolmakers in the plastics and pressure diecasting industries dealing with mould design, construction and maintenance.

259 pp.

OBTAINABLE FROM ALL BOOKSELLERS

In case of difficulty write to the Publishers, who will also be pleased to supply further information and a detailed list of contents for each book.

TEMPLE PRESS LIMITED

BOWLING GREEN LANE, LONDON, E.C.1 TERMINUS 3636

Plastic Scrap WANTED

Especially

P.V.C. SCRAP OFFCUTS

Large quantities of Transparents, Opaques, Prints, Metallics.

Spot Cash.

Enquiries to :—

DAVIS BROS.

(METAL & PLASTICS) LTD.

20, ALL SAINTS' ROAD, LONDON, W.11.

PARK 5639

METALFLEX HOSE

All-Metallic

is the most suitable flexible tubing for

PLASTIC PRESSES

It gives longest trouble-free service and is supplied either in Bronze or Stainless Steel

BY

THE POWER FLEXIBLE TUBING CO. LTD.

Derby Works, Vale Road, LONDON, N.4

TINY OR **HUGE**

STRAIGHTFORWARD OR **COMPLICATED**

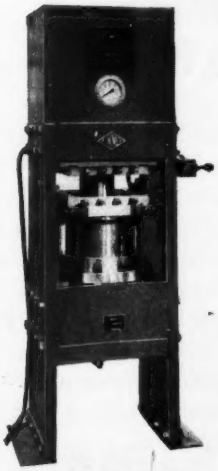
FAIR QUANTITIES OR **MASS PRODUCTION**

from **Design**
through the **Tools**
to the finished **Moulding**
WE WILL SEE IT THROUGH FOR YOU!

STEWART PLASTICS LTD
MANUFACTURERS OF PLASTIC GOODS · TOOLMAKERS
45 MORRISH ROAD, LONDON, S.W.2. TEL: TULSE HILL 1082. CABLES: PLASINJECT, LONDON

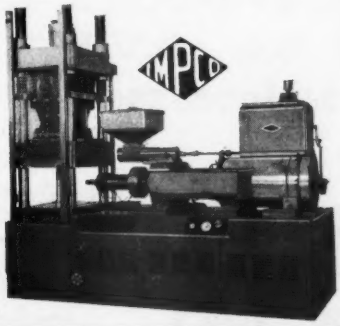
FINNEY HYDRAULICS

Everything for the Plastics Trade



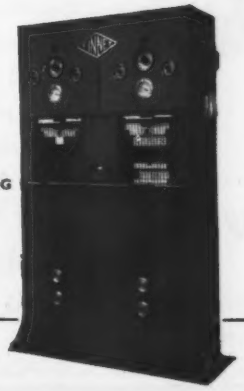
HOBBING PRESSES FOR IMPROVED TOOL MAKING
Compact, space-saving design. From 200-1,000 tons. Ample daylight and bolster area. Fabricated in high-tensile steel. Completely self-contained.

A NEW TECHNIQUE IN INJECTION AND TRANSFER MOULDING
A 500-ton Downstroking Press for clamping and 100-ton Upstroking transfer ram which may be used to give additional pressure to eliminate shrinkages or flow marks. It may also be used to shear gates, pierce or engrave under part of moulding, or to eject. The horizontal injection unit is of conventional type and may be supplied with interchangeable cylinders of varying capacities, 8-32 ozs. THE PERFECT MACHINE FOR USE WITH METAL INSERTS.



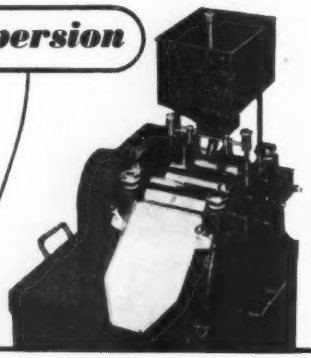
HYDRAULIC PUMPS AND VALVES
High-speed, single- or multi-stage pumps, constant or variable pressures with patented automatic change-over and relays. High pressures and large volumes to suit individual needs. Oil operation.
Control valves for oil or water. Solenoid or hand-operated. All sizes and duties. Relief valves of all types, including release of air from hydraulic systems.

DUAL UNIT FOR TRANSFER OR COMPRESSION MOULDING
50-ton Upstroking clamp.
12-ton Downstroking transfer plunger.
Automatic time cycle control.
Automatic cycling control.
Automatic interlocking guards.
Completely self-contained.



SOLD THROUGH **FINNEY PRESSES LIMITED**
BERKLEY ST., BIRMINGHAM, I. *Phone:* MID 3795/6. *Cable:* FINHYD, B'HAM.

dispersion



PASCALL

triple roll mills ensure a uniform dispersion throughout the mass and speedily produce a smooth, perfectly refined product. Models available for production and laboratory purposes, and equipped with hollow steel rolls for heating or cooling.

Available with steel or porcelain rolls.

Write for list 288

Tel : Paddington 7236

THE PASCALL ENGINEERING CO., LTD., 114, LISSON GROVE, LONDON, N.W.1

Reliable supply of

MOULDING POWDERS

Cellulose Acetate
Phenol & Cresol Formaldehyde
and other
Thermoplastic & Thermosetting Powders

Industrial Plastics Ltd. offer manufacturers in Britain and abroad a continuous, prompt and reliable supply of many types of general and special purpose injection and compression moulding powders on most competitive terms. Technical consultative service is always available.

INDUSTRIAL PLASTICS
LIMITED

London and Export Office :

Piccadilly House, 16/17, Jermyn St., London, S.W.1

Telephone : GROsvenor 2848/9

Cables : IPLA, LONDON

NO LIMIT

. . . no limit to the service we are prepared to give you in the production of compression and injection mouldings. For all the problems connected with design, toolmaking, production and assembly consult :

W. W. BALL & SONS LTD.

Burstead Works, Kennel Lane, BILLERICAY, Essex

'phone - B'cay 411/12 'grams - Plastool

YOU CAN RELY ON HAIGH'S FOR STEARINES

The high quality of HAIGH'S Stearines is maintained at every stage of manufacture. Our fine modern plant for continuous vacuum distillation of fats gives a good start, the process being completed by the most careful pressing. Owing to the supply position the number of grades is limited, but we do maintain an adequate range to meet most requirements.

JOHN HAIGH & CO. LTD.

Established 60 Years

CLAYFIELD OILWORKS - SLAITHWAITE - YORKS

Telephone: Slaithwaite 266/267

HS22

STABILISERS

FOR POLYVINYL CHLORIDE AND FOR VINYL TYPE LATICES

Dispersed stabilisers assist factory hygiene, facilitate and speed up compounding with Vinyl Latices.

ASSOCIATED LEAD PRODUCTS

Genuine English White Lead dispersed in plasticiser :
A stable dispersion of White Lead in phthalate or other plasticisers to give heat and light stability to opaque P.V.C. and vinyl copolymer products.

Cadmium Stearate dispersed in plasticiser :
A stabiliser for use in the production of crystal clear P.V.C. and vinyl copolymer products.

Lead Stearate dispersed in plasticiser :
A heat and light stabiliser for transparent and decorative P.V.C. and vinyl copolymers. Greatly assists in lubrication.

ASSOCIATED LEAD
MANUFACTURERS LIMITED

SPECIAL CHEMICALS DIVISION: **CRESCENT HOUSE, NEWCASTLE UPON TYNE, 1**

HARRIS—*the Plastic Scrap People*

You are assured of fair prices, speedy collections and prompt payments if you offer your

"Perspex" Acrylic
Cellulose Acetate
Cellulose Nitrate
P.V.C. and all other
Thermoplastic Scraps

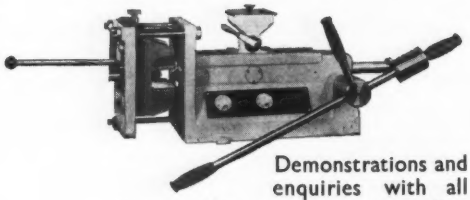
to

Alfred HARRIS & Co. (Richmond) Ltd.
MANOR PARK · RICHMOND · SURREY
Phone: 0028/9

The "PLASTICOR"

½ OZ. HAND OPERATED PLASTIC INJECTION MACHINE

1 Amazing economy of Die costs.
2 Easily operated by unskilled labour.
3 Interchangeability of chambers for colour and material changes.
4 Remarkable compactness of machine.
5 Low initial cost of machine.
6 Complete efficiency and ease of operation.



Demonstrations and enquiries with all co-operation given to intending purchasers at our own works.

DAVIDSON'S (MANCHESTER) **LTD.**
HAYES YARD, GARRATT STREET, MANCHESTER 10 *COLLYHURST 1610*

RADYNE

Radio Frequency dielectric preheater

The RADYNE H25/A has been designed to meet both the needs of the plastic manufacturer who wishes to heat 1½ to 2 lbs. of powder really fast, and also those of the manufacturer who wishes to pre-heat relatively large loads. The efficiency of the 3 kW Output RADYNE H25/A is just as high when it is plasticising 1½ lbs. of phenolic preforms in 45 seconds or 10 lbs. in 4 to 5 minutes.

RADIO HEATERS LTD
WOKINGHAM BERKS ENGLAND

OUR NEW WASTE PAPER BALING PRESS

has been designed to meet a demand of long standing for an inexpensive but well-constructed and strongly made Press, suitable for the average business.

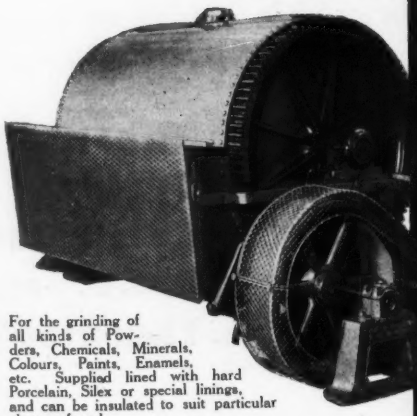
It helps—

1. To keep your Premises clean and tidy.
2. To save Storage Space.
3. To increase the value of Waste.
4. To reduce the danger of Fire.
5. To prevent the contents of your Paper-baskets passing into unauthorised hands.

Full details from the manufacturers.

TYNE TRUCK & TROLLEY CO. LTD.
First Avenue, Team Valley Estate, GATESHEAD-ON-TYNE, 11
Telephone: Low Fell 77104 and 77105

STEEL-SHAW PEBBLE MILLS



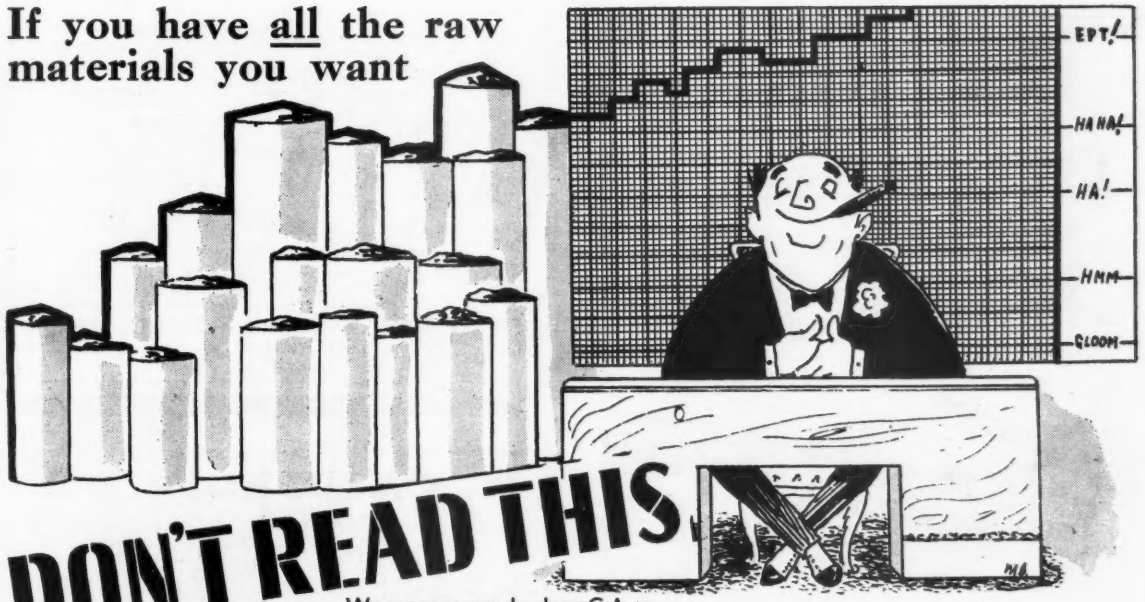
For the grinding of all kinds of Powders, Chemicals, Minerals, Colours, Paints, Enamels, etc. Supplied lined with hard Porcelain, Silex or special linings, and can be insulated to suit particular classes of work.

Send for our free illustrated literature

STEELE & COWLISHAW, LTD.,
Engineers (Dept. No. 27)
Head Office and Works:
COOPER STREET, HANLEY, STOKE-ON-TRENT
London Office: 329, High Holborn, W.C.1
Telephone: Holborn 6023

Nearly ½ a Century's Experience in Grinding

If you have all the raw materials you want



DON'T READ THIS

We reprocess and colour C.A. to our standard colour range or if your scrap is suitable to the colour you specify to all intents and purposes you have a "new" material. The process is speedy, it incorporates the magnetic separation of ferrous particles and the cost is very small. We can normally supply reconstituted C.A. moulding powders in all standard colours. Either service will save you quite a lot of money, please write or 'phone for full details.

Grist PLASTICS LTD

Telephone: ELMbridge 4214

82-84 BRIGHTON ROAD, SURBITON, SURREY

Reliability PLUS . . .

The Ermeto joint is reliable and can be left for years without attention. Capable of withstanding the highest industrial pressures, it is quick and simple to use and does not require skilled labour. It is unaffected by vibration, can be made and broken indefinitely, and is completely pressure-tight under all conditions.

We are always pleased to forward copies of catalogues, price lists, etc., covering our standard ranges of pipe fittings and high-pressure valves.

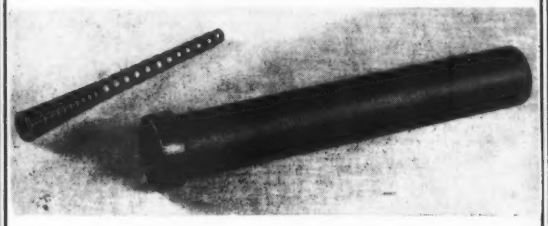
ERMETO SELF-SEAL COUPLINGS

BRITISH ERMETO CORPORATION LTD., MAIDENHEAD, BERKS.

ALFA

FIRST IN PLASTICS

Immediate Quotations on Receipt of your Drawings or Patterns
Early Delivery Full Technical Service



Supplying Industry all over the World

ALFA PLASTICS LIMITED
20, The Highway, Stepney, London, E.1
Telephone: Royal 4011/4012

Don't write off

ANY SCRAP

POLYETHYLENE

no matter how contaminated.

After reprocessing, we
guarantee insulating properties!

By a process unique in this country (and, to the best of our knowledge, in the world) we can undertake to reprocess your scrap polyethylene—no matter how contaminated—and to *guarantee its insulating properties.*

Polyethylene reprocessed by our methods can be *coloured to specification* **and can be reconstituted to your precise requirements in respect of plasticiser content, etc.**
We are able to offer limited quantities of reprocessed guaranteed material for sale and we are naturally interested in buying scrap in any condition at top prices.

In inviting your enquiries for our service—which we believe will reduce scrap loss and help to soften the effect of the shortage of materials—we wish to make it quite clear that we do not manufacture or supply prime polyethylene.

ALL ENQUIRIES TO:

POLYTHENE Limited

100 JERMYN STREET, S.W.1
Telephone: WHitehall 3978

WANTED STOCKS FOR CASH

WE are cash buyers of merchandise of every description. Also Clearance Stocks, Discontinued Lines, Surplus Stocks; in fact, goods of all kinds can be disposed of through us, without delay, on the most favourable terms, and without trouble.

SHOULD you have anything for disposal, either now or at any future time, please send us samples, full particulars and price on a cash settlement basis.

RELIANCE TRADING COMPANY
13, New College Parade, Finchley Road, London, N.W.3
TELEPHONE: PRIMROSE 3167 AND 5611

M. CALDERON LTD.

SPECIALISTS IN
THE MANUFACTURE OF
HEATING ELEMENTS
FOR THE
PLASTICS MOULDING INDUSTRY

ALL ENQUIRIES TO HEAD OFFICE:
227 UPPER STREET,
LONDON, N.I. **CAN. 4696.**

M.C.M. (TOOLS) LTD.

DESIGNERS AND TOOLMAKERS
FOR
COMPRESSION, TRANSFER AND INJECTION MOULDS, JIGS AND FIXTURES.

LET US SOLVE YOUR DIFFICULTIES

M.C.M. (Tools) Ltd.,
12, DENMARK ST.,
ASTON,
BIRMINGHAM, 19.
Aston Cross 1878.

LONDON & SCANDINAVIAN METALLURGICAL CO LIMITED

Injection moulds for small and intricate articles

Sole manufacturers of hard nickel electroformed cavities

DIES FOR BLOWN POLYTHENE FANCY BOTTLES

CHELTON WORKS, GONSALVA ROAD,
LONDON, S.W.8. MACaulay 5575

L1186B

I'm perfect at printing on plastics

* I've had the same friends for many years. They come again and again to see me not only about printing, but about engraving and fabricating Plastics. *Can I include you among them?*

UK PLASTICS LTD

Subsidiary Company
Celluloid Printers Limited

ESTABLISHED 1911

KINGSTON BY-PASS, SURBITON, SURREY

Phone ELMbridge 2814-5 *Grams : Celluprint, Surbiton*

STERNITE

PHENOLIC MOULDING POWDER

General Purpose and Special Materials including Shock Resisting, Transfer, Cabinet and High Resin Content Grades.

SYNTHETIC RESINS

CELLULOSE ACETATE and P.V.C. COMPOUNDS and PASTES

We offer prompt delivery of best quality materials at the keenest prices for all Home and Export requirements.

STERLING MOULDING MATERIALS LTD.

Sterling House, 8, Heddon Street, Regent Street, London, W.1

Works : Stalybridge, Cheshire

Phone : Grosvenor 5301.

Export Enquiries to : STERLING PLASTICS LTD.

Telegrams: Stermold, Wesdo, London
Cables : Stepla, London

Plastic Raw Materials of all kinds

CHAS. PAGE & CO., LTD.

Home Trade and Export

52 GROSVENOR GARDENS, VICTORIA, LONDON, S.W.1

Telephone: SLOane 8151 (10 lines)

Also at :—GLASGOW, MANCHESTER and NEW YORK

Telegrams: Paganini, Sowest, London

JH&C S

MOULDS
OF
DISTINCTION

J. H. CARPENTER
AND SON, LONDON, LTD.
TOOL MAKERS

107a, YORK WAY, LONDON, N.7
Telephone: Gulliver 3917

MICHAEL S. STEVENS

PLASTIC SCRAP

Buyers at Your Works of
Injection Scrap, Scrap Cuttings

Now at
KESWICK WORKS, KESWICK ROAD, PUTNEY, S.W.15
VANdyke 3345

SUPPLIES FROM STOCK

CASEIN SHEETS RODS TUBES

CAST SYNTHETIC RESIN
SHEETS RODS TUBES PROFILE SHAPES

P.V.C. SHEETING
All thicknesses and widths

WARERITE PANELS
All colours

CELLULOSE ACETATE SHEETS
from 0.05" to 7 mm. thick. Opaque and Transparent. Flesh and T/shell Optical quality

I.C.I. "CRINOTHENE" in all shades

ACETATE SHEETS FOR LAMP-SHADES
All colours. Bexoid, May and Baker, Utilex, etc.

CELLULOID—all thicknesses

"PERSPEX" BRAND ACRYLIC RESIN SHEETS
from 1/24" to 1"—Clear and Coloured

EBONITE SHEETS RODS

MOULDING AND INJECTION POWDERS

GILBERT GALEA
MERCHANT IMPORTER-EXPORTER
Established 1918
Dominion House, Bartholomew Close, London, E.C.1
Phone: MONarch 3994 & 6770. Grams: Gilgalbert, Cent, London

DECORATION of PLASTICS

Our new Universal Duplex Transfer can be used to decorate *ANY* plastic material. Rigid or Flexible, rough or smooth. Ideal for "Crinothene," embossed leather cloth, P.V.C., etc.

Let us send you samples and stock list.

P. L. AXON HARRISON, Jersey, C.I. (Eng.)

BYSON FOR BAKELITE

Acetate and other Synthetic Mouldings. Modern Plant and Facilities

APPLIANCE CO. LTD.,
WOOLFOLD, BURY, LANCS.
Telephone: Bury 1560-1. Telegrams: "Bysonite, Bury."

Plastic P.S. Scrap

A post-script turned to a profitable sale

AS MANUFACTURERS WE PAY
THE BEST PRICES

SPECIAL FACILITIES FOR CLEANING
GRADING AND TECHNICAL CONTROL

ENSURE AN OUTPUT OF
QUALITY MATERIALS ONLY

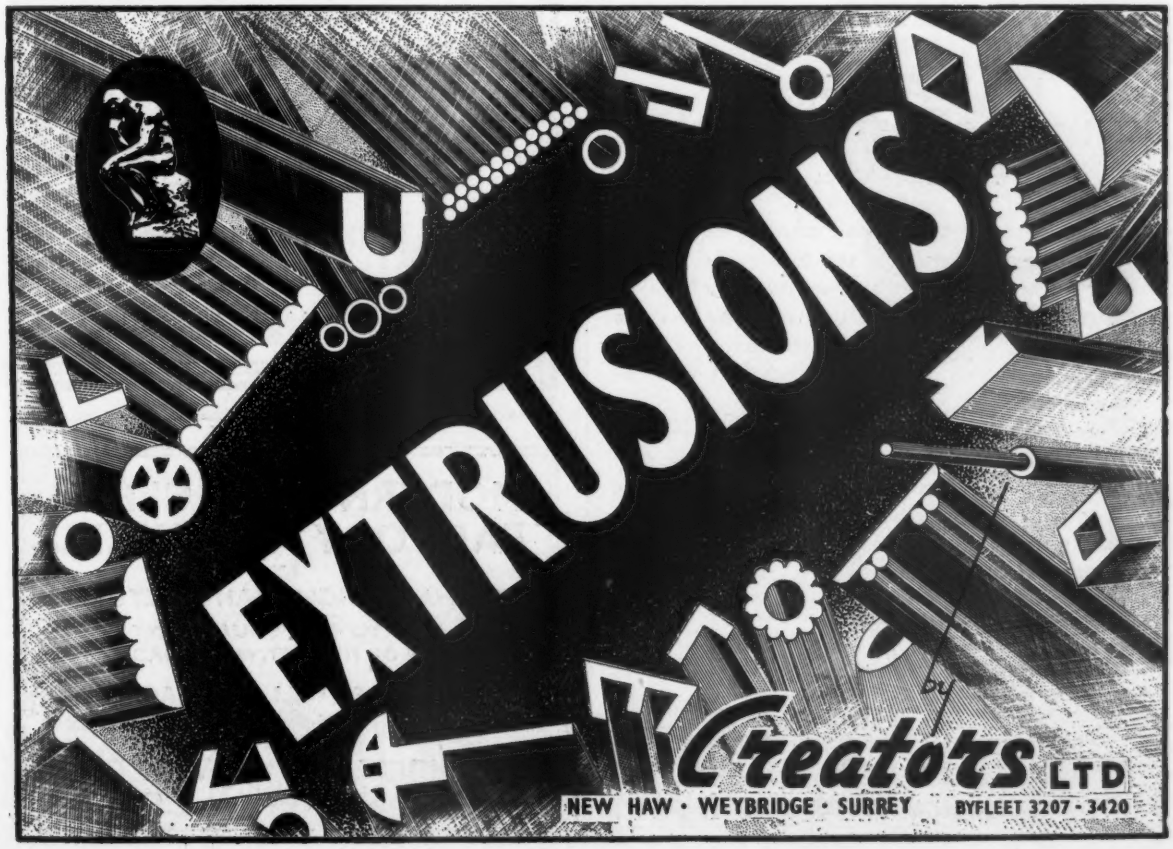
P.S. whatever the supply — we always buy

Almex Ltd.

B'ham Office: 78-82 Exchange Buildings. Phone: MIDland 0682

FINSBURY PAVEMENT HOUSE,
120, MOORGATE, LONDON, E.C.2.
Telephone: METROPOLITAN 9641

IMPERIAL WORKS • WATERY LANE • BIRMINGHAM 9



VARIABLE SPEED DRIVES

FOR

Plastics Machinery

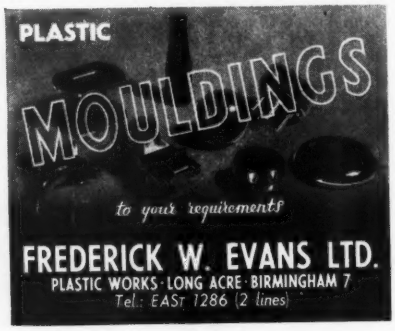
- CONTROL ADJUSTABLE WITH UNIT RUNNING OR STATIONARY.
- HAND, ELECTRIC REMOTE, OR AUTOMATIC CONTROLS.
- 27:1 SPEED RATIO ON FULL LOAD.
- MAY BE USED AS A CLUTCH TO PICK UP LOADS FROM ZERO SPEED.

ENGINEERING, MARINE & WELDING EXHIBITION
Stand 9, Row AA, First Floor, Empire Hall,
OLYMPIA - - AUGUST 30—SEPTEMBER 13

CARTER GEARS LTD.

THORNBURY ROAD

Phone: 64378/9 **BRADFORD** **Grams: "Became"**



FIRE!

WHERE'S YOUR

NU-SWIFT?

The World's Fastest Fire Extinguishers
— for every Fire Risk

Pressure-operated by sealed CO_2 Charges

NU-SWIFT LTD. • ELLAND • YORKS

In Every Ship of the Royal Navy

PLASTICS, SCIENTIFIC AND TECHNOLOGICAL

by H. R. Fleck, M.Sc., F.R.I.C.

THIS RECOGNIZED STANDARD WORK covering the scientific and technological aspects of the ever-growing plastics industry has now been entirely revised for a third edition. It comprises an up-to-date critical survey of the literature and a correlation of the scattered data which will be of value both to chemists in the plastics industry and to the practical men whose work requires a knowledge of the chemistry and technology of plastics.

The latest developments in plastic materials are discussed in great detail. It also contains valuable tables, diagrams and data primarily for technicians, chemists, professional men and students who are seeking much more than an elementary book on the subject.

Illustrated

Price 40s. net.

(by post 40s. 9d.)

TEMPLE PRESS LIMITED

BOWLING GREEN LANE · LONDON · E.C.1

PIONEERS

IN

MOULDS

for MODERN PLASTICS

also

PRESS TOOLS, JIGS & GAUGES

BARBER & DUFFY LTD.

214/222 CARDIGAN ROAD · LEEDS

Phone: Leeds 52033

MODERN AND CLEAN FACTORY REQUIRED

BY

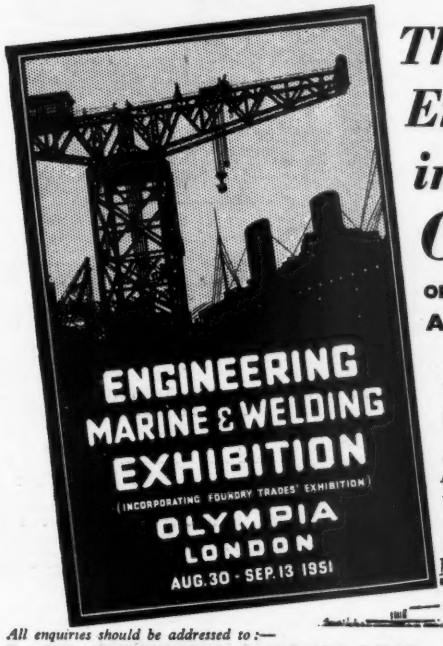
PHARMACEUTICAL MANUFACTURERS

25,000 TO 40,000 SQUARE FEET
ON OR NEAR GT. WEST ROAD

GOOD PRICE WILL BE PAID FOR PROPERTY WITH PROMINENT POSITION

CHAMBERLAIN & WILLOWS

23, MOORGATE, E.C.2 **CITY 6013**



The entire Engineering Industry in one Exhibition—

OLYMPIA (ALL HALLS)

OPEN DAILY (EXCEPT SUNDAYS) **10 a.m. – 8 p.m.**

AUG. 30th — SEP. 13th, 1951

Admission 2/6d. (including tax)

THE LARGEST EVENT OF ITS KIND IN THE WORLD

Special facilities are available for parties of Employees of interested Engineering firms and technical Trainees.

Travel facilities and Hotel accommodation can now be arranged through the Organizers.

All enquiries should be addressed to :—

F. W. BRIDGES & SONS LTD., GRAND BUILDINGS, TRAFALGAR SQ., LONDON, W.C.2 *Phone:* WHitehall 0563

Before you market—Mark it!

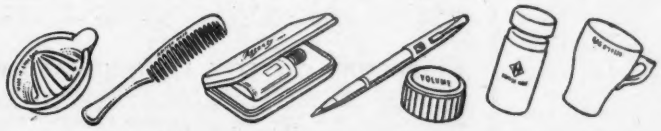
FUNDITOR

Sand-jet

MARKING MACHINES

The clear-cut mark is produced by means of a short blast of fine grit material through a rubber mask into which the trade-mark, numbers, letters, graduations or decorative designs have been cut. Marks Plastics, Ceramics, Hardened Steel, Stainless Steel, Carbide, Glass, etc. Also delicate thin-walled parts with ground or polished surfaces which cannot be impressed by other Marking Methods.

Send to-day for fully illustrated leaflet.



Funditor Ltd.

3 WOODBRIDGE STREET, LONDON, E.C.1 *Phone:* CLErkenwell 6155/7

Classified Advertisements

The rate for paragraph announcements is 4d. per word, minimum 4s. —— Semi-Displayed Space 50/- per inch.
Series discounts: 5% for 6 and 10% for 12 consecutive insertions. Terms: Cash with order. Box number fee: 1/-

AGENCIES

IMPORTANT FRENCH COMPANY using all types of plastic materials for industrial purposes (by injection, moulding and coating) desires to acquire licences for France and Western Europe for foreign patented processes on a Royalty basis. Box P681, care of "Plastics." 169-2527

AUCTIONEERS' ANNOUNCEMENTS

By Order of the Owners.
117 (REAR OF) VICTORIA ROAD,
PORTSLADE, SUSSEX.
HENRY BUTCHER AND CO.
are instructed to offer FOR SALE at the HOVE TOWN HALL, HOVE, on
TUESDAY, 14TH AUGUST, 1915,
at 2.30 p.m.
AS A FIRST LOT,
THE FREEHOLD MODERN SINGLE-STOREY FACTORY PREMISES
containing an approximate
FLOOR SPACE OF 3,000 SQUARE FEET.
VACANT POSSESSION ON COMPLETION.
To be followed by the SALE IN LOTS, in DETAIL of the
PLANT AND MACHINERY,
including
"BERRY" 1,200-TONS VERTICAL UPSTROKE 2-COLUMN PRESS,
280 STAINLESS STEEL MIRROR PLATES,
50-TON 4-COLUMN UPSTROKE HYDRAULIC PRESS,
"TAUCO DELTA" 10-IN. UNISAW,
GUILLOTINES UP TO 48 INS.
IMPREGNATING PLANT,
ELECTRIC SAW BENCHES AND LINISHERS,
"SLINGSBY" LIGHT STACKERS,
ENGINEERS' LATHE AND SMALL TOOLS,
8-FT. BY 3-FT. 6-IN. VERTICAL STEAM BOILER AND FITTINGS,
1-TON ROLLED ZINC PRESSING PLATES,
"GRIFFIN AND TATLOCK" LABORATORY PLANT AND
EQUIPMENT.

NOTE.—The Auctioneers are prepared to entertain offers for the FREEHOLD PREMISES, together with the PLANT AND EQUIPMENT, any time up to ONE WEEK of the date of the Sale.

Combined Particulars of the Property and Catalogue of the Plant and Equipment (price sixpence each) may be obtained of MESSRS. CLUTTON, MOORE AND LAVINGTON, Solicitors, 6 Soho Street, Oxford Street, London, W.1, and of Auctioneers, Valuers and Surveyors of Factories, Plant and Equipment, 73 CHANCERY LANE, W.C.2. 169-9

BOOKS AND PUBLICATIONS

SIXTY COPIES "Plastics," April, 1945-March, 1950; 15 "Modern Plastics" (U.S.), September, 1948-November, 1949; 28 "Scientific American," January, 1946-April, 1948; 34 U.S. "Products Finishing," October, 1946-July, 1949; 20 "Light Metals," September, 1948-April, 1950. Complete, clean, no single copies sold. Lindsay, 31 Church Road, Bradmore, Wolverhampton. 169-4

BUSINESSES, PREMISES, OFFICES, ETC.

FACTORY for sale, North-East England, modern brick building, area approximately 3,000 sq. ft. on two floors, with plant, moulding presses, etc. Write, Box P6914, care of "Plastics." 169-x2379

DESIGN AND DRAWING

DESIGN AND DRAWING CAPACITY for plastic moulds (injection, compression, transfer), and component design development. Graystone Designs, 35 Winchester Road, Hampstead, N.W.3. Phone, Pri 7420. zzz-278

MACHINERY, TOOLS AND PLANT

"IMPETUS" MACHINERY, ex-stock, belt grinders or sanders, 4-in. band, £7; motorized, £15 10s.; also 6-in. model, 13-speed motorized ½-in. drilling machines, £18 10s.; exhaust fans, air compressors, paint spray plants, etc.; catalogue from manufacturers. John P. Steel, Dept. 8, Bingley, Yorks. zzz-267

ALTERNATORS. Diesel sets, electric motors, switch gear, transmission equipment, fluorescent lighting and industrial fittings, ex-stock. Keen prices. Contact G. L. Murphy, Ltd., Menston, near Leeds. zzz-210

JACKETED PANS. Eight copper melting pans, 18 ins. diameter by 12 ins. deep with covers, mounted in steel frames, with valves, steam traps, etc., as new, £25 each. Thompson and Son (Millwall), Ltd., Cuba Street, London, E.14. zzz-291

PLASTIC PLANT SPECIALISTS.
MODERN MOULDING PRESSES.
MIXING MILLS.
EXTRUDERS.
HYDRAULIC PLANT.
Always in stock. Send us your inquiries.
Whatever your NEED ask
REED BROTHERS (ENGINEERING), LTD.,
REPLANT WORKS,
CUBA STREET,
MILLWALL, LONDON, E.14. zzz-269

P.V.C. EMPOSSING CALENDAR, 3-roll 72-in. working face with steel embossing shell, complete with latest-type Metro-Vick infra red heaters, drive and motor suitable for P.V.C. leathercloth or unsupported sheet, pigskin shell included. Can be seen at Vinyl Products, Ltd., Butter Hill, Carshalton, Surrey. zzz-296

Machinery, Tools and Plant (contd.)

FOR SALE. Film casting machine, nickel band 24 ft. 6 ins. by 1 ft. 3 ins., fitted steam, infra red and electric heating. Complete with drive, variable gearbox and suction fan. £1,500. Detailed specification from Vinyl Products, Ltd., Butter Hill, Carshalton. zzz-305

B.C.S.
VERTICAL BOILERS.

(1) 2,500 lb. per hour brand new oil-fired vertical cross tube boiler, dia. 6 ft. 6 ins. by 14 ft. 0 in. high. 100 lb. working pressure. Complete with oil-firing equipment, chimney, water tank, oil storage tank, duplicate feed pumps, etc.
(2) 1,760/1,320 lb. per hour No. 9 size Cochran vertical multitubular boiler; new 1930; 100 lb. working pressure. Complete with fittings and mounting; prior automatic stoker, etc.
(3) 800 lb. per hour vertical cross tube boiler; new 1935, 3 ft. 6 ins. dia. by 9 ft. 0 in. high; 100 lb. working pressure; complete with fittings and mountings; Royles feed regulator; Weir feed pump; chimney, etc.

B.C.S. (ENGINEERS AND CONTRACTORS), LTD.,
3 CASTLE STREET,
CARDIFF.
Phone, Cardiff 8512-3-4. 169-2446

VIBRATORS and vibrating tables for hoppers, packaging, etc. Kolt Engineering, 70 Victoria Street, London, S.W.1. 172-2547

TOOLMAKERS have six impression teaspoon mould (compression) for sale. Brand new, chromium plated. Inquiries to Box P6812, care of "Plastics." 169-14

DANIELS 75-ton D/S prefilling press, single lever piston type control, 14 ins. by 14 ins. by 2 ins. platens. Electraulic pump, hanging bar ejector gear with special guard for loading back and front. All as new. Offers. Berry (Plastics), Portland Works, Annesley Woodhouse, Notts. 169-7

B.C.S.
DIESEL GENERATOR SET.

1,200 kW complete Diesel generating plant, comprised of two 1,250 b.h.p. vertical 6-cylinder, solid-injection, two-cycle, single-acting super scavenge Diesel engines by Sulzer; 375 r.p.m. each; direct coupled to 600 kW Met-Vick, 220v. D.C. 3-wire compound-wound generator. Complete with switchgear; air starting equipment; exhaust systems; water-cooling tower and softening plant, fuel-storage tanks; instruments, valves, gauges, piping, tools and spares.

Installed by Sulzer Bros. in 1948.

B.C.S. (ENGINEERS AND CONTRACTORS), LTD.,
3 CASTLE STREET,
CARDIFF.
Phone, Cardiff 8512-3-4. 169-2445

FOR SALE: One High-frequency welding machine, 1 kVA, as new. Manufactured by Applied High Frequency, Ltd. Offers. Park 9369. 169-6

SPECTACLE FRAME INJECTION MOULD (new) available, three complete frames and sidepieces per shot. Suitable 4 oz or 8 oz. machines. Inquiries to Box P691, care of "Plastics." 169-32

ONE FRITZ KILIAN tableting machine, 10 punch double pressure, suitable for compressing powders or similar materials, 2,000/6,000 tablets per hour, according to size and materials; matrices about 5 ins. diameter; five pairs punches 3 ins. by 1⅞ ins., five pairs punches 3 ins, by 2 ins.; eight pairs punches 3½ ins. by 2¼ ins.; net weight 2½ tons. Motorized with Higgs 4 h.p. geared motor 3-phase 50 cycles, 415 volts, 1,425/92 r.p.m. Box P6910, care of "Plastics." 169-22

MASSEELEY STAMPING MACHINES AND SUPPLIES, always available from, Hill Bros., Acton Works, Beaconsfield Road, W.4. Chiswick 2235. 170-2523

MACHINERY, TOOLS AND PLANT WANTED

WANTED: Multi-platen hydraulic press, platens 24 by 24 or larger pressure, 500 lb. p.s.i. on platens. Box P6913, care of "Plastics." 169-19

WANTED: Used compression tools of commercial interest suitable for 10-ton press 12-in. by 12-in. platens, and 5in. ram. Price and sample. British Technical Plastics, Ltd., Whitley Bay, Northumberland. 169-13

WANTED: 50-ton or up moulding presses. Box P6912, care of "Plastics." 169-18

⅛-OZ. INJECTION MOULDING MACHINE. Details and price to Stokes, 81 Greenway Avenue, London, E.17. 171-x136

WANTED: Reavell compressor for E.M.B. injection moulding machine, complete with air receiver, switch gear, etc. Please write Box P6916, care of "Plastics." 169-x1449

PATENTS

BRITISH PATENT No. 582.338. Plastic piping required with flanges, instead of steel piping. See lines 110-115, page 2, of above Patent. Piping must withstand 60 volts and a feed water pressure of 150 lb. per sq. in. at a maximum temperature of 180 degrees F. Box P6917, care of "Plastics." 169-x2788

PRODUCTION CAPACITY AVAILABLE AND WANTED

FAIRMAN PRECISION TOOLS AND PRODUCTS, LTD., of Horley, Surrey, have capacity for the manufacture of Bakelite and plastic moulds, diecasting, dies, press tools and special-purpose machines. Also all classes production machining. Phone, Horley 909. 172-2042

INJECTION MOULDING CAPACITY available up to 4 oz. Precision moulding a speciality Guardian Plastics, 345 Kennington Road, London, S.E.11. 173-2082

REPETITION in Ebonite, Erinoid, etc. Capstan lathe work. Mansell, Temple Street, Rugby. 173-2080

INJECTION MOULDING by I.O.G. Industries, Ltd., 41 Marshgate Lane, Stratford, E.15. Maryland 2804. 172-2259

COMPRESSION AND INJECTION MOULDINGS, capacity available, reasonable delivery, competitive prices. Box P644, care of "Plastics." 169-2253

DOHM, LTD., PULVERISING raw materials everywhere. 167 Victoria Street, London, S.W.1. zzz-304

Production Capacity Available and Wanted (contd.)

CAPACITY AVAILABLE on modern injection-moulding plant, from 2 to 6 oz. Specialists in the manufacture of mouldings from the prototype stage, including design and development. Quick delivery and guaranteed production. Box P6112, care of "Plastics." 172-2333

DINES PRODUCTS, Stanley Road, Grays, Essex, for injection moulding. 171-2368

WORK WANTED. Shapers of rigid p.v.c. sheet, negligible tool costs, short or long runs. B.D. Co., 66 High Street, London, N.8. 169-2449

SHORT RUNS A SPECIALITY. Long runs a pleasure. Low mould costs and overheads on our Westminster injection machines. Westminster Plastics, 367 High Street, North, Manor Park, London, E.12. Grangewood 3777. zzz-0301

PLASTICS (MANCHESTER), LTD.,
Britain's Leading Stockists.
SPECIALISTS IN
FABRICATION, INJECTION,
MOULDING AND ENGRAVING.
11 WHITWORTH STREET, MANCHESTER, 1.
CENTRAL 0272-1725. zzz-308

CAPACITY AVAILABLE for the design and production of plastic moulds (compression). Write Box P6712, care of "Plastics." 169-2452

SPACE AND LABOUR (Surrey, female), available for light hand assembly; inspection; sorting; packing or general repetition work; anything considered; reliable delivery promises. Box P6820, care of "Plastics." 169-x9956

MOULDING CAPACITY available up to 3 ozs. injection and 50 tons compression. Small electrical medical equipment mouldings our speciality. Solsway Plastic Laboratories, Ltd., Lancaster Road, High Wycombe. Phone, High Wycombe 2136. 169-x1407

PROVINCIAL FIRM of production consultants available now for further contracts. Excellent record. References available in strict confidence. Reasonable fees. Quotations free. Box P6915, care of "Plastics." 169-x2029

RAW MATERIAL AVAILABLE AND WANTED

WASTEPAPER WANTED. Regular collections arranged. Your office records confidentially destroyed. Thermoplastic scrap also collected. Dribbell. Phone, Battersea 3301. 174-2593

THERMO-PLASTIC SCRAP AND MOULDING POWDERS of all types wanted. We collect and pay cash. Box P614, care of "Plastics." zzz-287

"CHEMICALS, PIGMENTS, METAL POWDERS." Dohm, Ltd., 167 Victoria Street, S.W.1. zzz-0298

WASHED ACETATE X-RAY SHEET, sizes 8½ ins. by 6½ ins. to 15 ins. by 12 ins., and parcels mixed sizes. Celastoid sheet, 27 ins. by 24 ins. by .015 in., in pink, green, blue. Mixed acetate and nitrate rolls, 5 ins. by approximately 24 ft., with light imprint similar in sheet, approximately 24 ins. by 20 ins. by .003 ins. Lists and samples from Lloyd's, 2 High Street, Christchurch, Hants. Phone, Christchurch 504. zzz-302

PERSPEX! PERSPEX!! PERSPEX!!! Official stockists for I.C.I. acrylic sheets. Sheets cut your requirements. Fabrication and mounting specialists to the trade:—
S. C. Errington (Hanwell), Ltd., 132a Uxbridge Road, Hanwell, London, W.7. Phone, Ealing 5288. zzz-282

PERSPEX, CLEAR AND COLOUR, ACETATE SHEET, CLEAR. In spite of present shortage conditions, we most probably have your particular requirements. Ring Can 3425. F. J. Bly and Co., Empire Arcade, 370 Upper Street, London, N.1. 174-2594

FOR SALE: Cellulose acetate moulding powder, virgin and reground: Polystyrene, virgin and reground; Alkathene, virgin and reground; reground Butyrate and Frakon. Please inquire Herbert Connor, 120 Beaufort Park, Falloden Way, London, N.W.11. 169-1

PERSPEX. Sale or exchange. 250 pieces 3½ ins. by 2⅜ ins., red 400, 2 pieces 3 ft. by 2 ft., 2 ft. by 2 ft. 8 ins., amber 300. Numerous pressed signs "Private," "Gents," "Ladies" on pink and pale blue, 7 ins. by 2 ins., 4s. each. Wanted Red 461. Wilson, 51 Codsall Road, Wolverhampton. 169-x2083

PERSPEX, clear and coloured sheets, in most thicknesses, also large-size offcuts, for sale. Box P692, care of "Plastics." 169-31

ADVERTISER, requiring soft and medium grades P.V.C. extrusion compounds, would exchange rigid P.V.C. compound, glazed cotton and copper wire. Offers to Box P693, care of "Plastics." 169-30

NYLON SCRAP WANTED. Fearnhill Eng. Co., Ltd., Salop Street, Birmingham. 169-29

VERY SUBSTANTIAL QUANTITY ACETATE AND NITRATE first-quality sheets for sale, all colours, 20/1,000, 25/1,000 and 30/1,000ins. Box P695, care of "Plastics." 169-27

SUBSTANTIAL quantities Virgin Cellulose Acetate for disposal. Write Box 6393, Frost-Smith Advertising, 64 Finsbury Pavement, London, E.C.2. 169-5

Always large stocks of
CASEIN
rods, tubes and sheets.
PERSPEX
sheets up to 1-in. thick.
CELLULOSE ACETATE.
S. Rosenfield,
98 Aldersgate Street, E.C.1.
Phone, Monarch 4686. 174-2592

WANTED TO PURCHASE FOR CASH. "CELLOPHANE" CELLULOSE FILM SHEETS or rolls, 300, 400 and 600 SUB. Send samples with full details and prices.
Allans, 37 Farringdon Street, E.C.4. Phone, Cen 5947. 169-17

CATALIN RODS. Large quantity for sale, 7/16-in diameter, 21 ins. long in translucent amber, red, blue; also tortoiseshell, honey mottle and black at 25% under list prices. John Castle and Co., Ltd., 5 Hurley Road, Kennington, London, S.E.11. Reliance 4274. 169-16

POLYSTYRENE CLEAR SHEETS and rods and foil for sale. Sheets 16 by 24 by 1/2-in. to 1⅝-in. thick. Rods ⅝-in. to 1½-in. diam., 24 ins. long. Foil 13/16-in. wide by 3¼-mils. thick, in coils, about 2 tons in all, but small quantities supplied.
John Castle and Co., Ltd., 5 Hurley Road, Kennington, S.E.11. Phone, Rel 4274. 169-15

UREA FORMALDEHYDE MOULDING POWDER. Surplus to requirements. Up to 10 cwt. each in ivory and red. Offers. Perry (Plastics), Portland Works, Annesley Woodhouse, Notts. 169-8

WANTED TO COMPLETE OUTSTANDING CONTRACT, white opal Perspex ⅛-in thick. Offers to Granada Poster Dept., 6 Cromwell Road, Kingston. 169-2

THERMOPLASTIC: Perspex sheets and scrap moulding powder wanted. We collect and pay cash. Box P6310, care of "Plastics." 174-2162

WANTED: Perspex and PVC scrap, large quantities only. Box P6311, care of "Plastics." 174-2163

Raw Material Available and Wanted (contd.)

ACRYLIC SCRAP URGENTLY REQUIRED, state amount available, coloured and clear. Quotation by return to Box P6414, care of "Plastics." zzz-299

TOP PRICES PAID for Cellulose Acetate scrap. We collect and pay cash. Box P6415, care of "Plastics." 169-2262

"DELAFILA" THE INERT FILLER. Selected and finely ground Delabole slate. Light in colour, uniform in particle shape and other physical chemical and mineralogical characteristics. Available in a wide range of finest grades. Prompt deliveries. A product of The Old Delabole Slate Co., Ltd., Delabole, Cornwall zzz-307

REQUIRED URGENTLY, small or large quantities of ethyl cellulose, cellulose acetate butyrate (Tenite II), cellulose propionate or polyvinyl butyral (Butvar)—virgin or scrap—unpigmented only. Box P684, care of "Plastics." 170-2531

CATALIN. Large stocks, large variety of sections and colours, immediate delivery. J. H. Berry (Plastics), Annesley Woodhouse, Notts. Phone, East Kirkby 2151. 169-2526

CELLULOSE ACETATE SHEETING or offcuts, 2 mm. and 4 mm. thick, required by Opticrafts, Ltd., Alpha Road, Surbiton. Crystal and Flesh. 170-2525

ERLANOS, LTD., 93 Aldersgate Street, E.C.1 (Monarch 4686), require Perspex and cellulose acetate offcuts and scrap, clear and coloured, highest prices paid. 173-2524

BLACK PHENOL MOULDING POWDER wanted, any grade, any quantity. Box P686, care of "Plastics." 169-2530

CLEAR CELLULOSE ACETATE TUBING for all pen refills. Lactoid and erinoid rods in mottled, silks and plain colours. Ebonite rods, tubes and sheet. Prompt deliveries assured from A. E. Goodeve, Ltd., 188a Seven Sisters Road, London, N.7. Archway 3654. 175-2261

MOULDINGS AND FABRICATIONS for industry, display, showcards. Also optical products, in Perspex, acetate, polystyrene, for home and export. All inquiries are cordially invited by W.H.W. Plastics, 58 Bingfield Street, London, N.1. 169-2448

POLYSTYRENE SHEETS AND ROD. Sheets 28 ins. by 20 ins. and 22 ins. by 18 ins. Rod, various diameters in 6-ft. lengths. Also Acrylic rod in various diameters. Miltoid, Ltd., 34-36 Royal College Street, Camden Town, N.W.1. Phone, Euston 6467. 169-2447

4½ TONS BUFF VIRGIN DIAKON MOULDING POWDER for sale. Apply Box P6725, care of "Plastics." zzz-306

SITUATIONS VACANT

WANTED, for a well-established South African plastics manufacturing firm, an experienced engineer or technician fully acquainted with injection, compression and extrusion moulding. Applicant can be engaged as an employee with the right to aquire an interest in the advertiser company which earns satisfactory profits. Reply immediately to Advertiser, P.O. Box 5008, Johannesburg, South Africa. 169-3

PLASTICS. Complete, inexpensive tuition at low inclusive fees. For free details, write to The Principal, The Rapid Results College of Engineering Technology, Dept. E.152, Tuition House, London, S.W.19 (or call at 235 Grand Buildings, Trafalgar Square, W.C.2.). Whitehall 8877. zzz-300

SENIOR DRAUGHTSMAN required by well-known plastics concern engaged in compression and transfer moulding. The position offers scope for advancement to the selected applicant. Replies should state age, qualifications, full details of experience, salary required, and will be treated in strict confidence. Box P6816, care of "Plastics." 159-2529

CHEMIST OR PHYSICIST having special degree in chemistry or physics invited to apply for vacancy in well-equipped laboratory in South London area. Applicants should not be above 27 years of age. Excellent opportunity for initiative and inventive ingenuity. Please send full particulars to Box P6813, care of "Plastics." 169-2528

PRODUCTION ENGINEER for plastic and precision woodwork with expert knowledge of costing, time study, etc. Top salary plus unlimited opportunity. Apply in first instance by letter, full details of past experience, Director, Microcell, Ltd., 109 Kingsway, W.C.2. 169-20

JUNIOR DRAUGHTSMAN required, knowledge of injection mould design essential. Write stating age, details and salary required. S.W. London area. Box P6911, care of "Plastics." 169-21

PLASTIC TECHNOLOGIST required to take charge of P.V.C. Laboratory dealing with development and routine testing of P.V.C. products. London area. Write stating age and experience. Box P699, care of "Plastics." 169-23

JUNIOR TECHNICAL ASSISTANT required for plastic manufacturers. Knowledge of thermoplastic resins and colour matching desirable. Age under 25. Box P698, care of "Plastics." 169-24

SENIOR RESEARCH EXECUTIVE required by important British plastics firm. He should have not less than five years' experience in this field. The salary will be commensurate with the importance we attach to this appointment. Applicants should send full details of themselves, their experience, and present occupation to Box P697, care of "Plastics." 169-25

YOUNG MAN in early 20s, with some technical knowledge of hydraulics, required for inside sales work in Shepherd's Bush office of well-known organization. Commencing salary according to age and experience. Good prospects of advancement. Superannuation Scheme. Applications, giving details of age and experience, should be sent to Box P696, care of "Plastics." 169-26

ESTIMATING ENGINEER required, age 25-35, for Contracts Office, laminated plastic manufacturers. Sound engineering background with initiative and ability conduct technical correspondence essential. Prospects of promotion. Pension Scheme. Write full details of salary required to Box P694, care of "Plastics." 169-28

ASSISTANT CHEMIST required South London area by progressive company engaged in highly specialized work on plastic materials. Minimum qualification Intermediate B.Sc., age not above 21. Wages commensurate with age, qualifications and experience. Canteen, social club, pensions scheme, good prospects. Reply to Box P6818, care of "Plastics." 169-11

PLASTICS TECHNOLOGIST required North-east Area factory; must be fully experienced formulation, manufacture, testing of thermosetting resins and moulding powders. Would be required on plastics problems and should have some knowledge moulding technique and tool design. Write stating full details, qualifications, to Box P6510, care of "Plastics." 169-12

EXPERIENCED FOREMAN required to take charge of injection moulding department at U.M.P. Southport factory. Please apply to Personnel Manager, Universal Metal Products, Ltd., Langley Road, Salford 6, Lancs. 169-10

TIME RECORDERS

FACTORY TIME RECORDERS. Service rental. Phone, Hop 2239. Time Recorder Supply and Maintenance Co., Ltd., 157-159 Borough High Street, S.E.1. 173-2081

MISCELLANEOUS

PACKING CASES AND BOXES FOR ALL PURPOSES. F. Rawle and Co., Ltd., 71 Kensington Avenue, London, E.12. Phone, Grangewood 2003. 171-1935

EXTEND YOUR TRADE
Use a Trade Mark. Consult
Trade Mark Protection Society,
12 Church Street, Liverpool. 178-2451

EXTRUSIONS
are our business . . .
Not just a department

AS the leading specialists in this field our technical staff welcome enquiries for all types of extruded plastics. We can promise you also keen personal service and a completely satisfactory product.

C&C MARSHALL LTD

PLASTRIP HOUSE, OAKLEIGH ROAD NORTH, LONDON, N.20
Telephone : Hillside 5041 (3 lines). Telegrams : Tufflex, Norfinch, London
Cables : Tufflex, London

WE WANT TO BUY

Plastics Machinery of all types

Including:—**Presses of all types • Mixers • High Speed Pumping Equipment • Large Size Reciprocating Pumps • Large Accumulators • Rubber Mills • Calenders**

Please send full details to :—

GEORGE COHEN SONS & CO. LTD
WOOD LANE, LONDON, W.12 *'Phone: Shepherds Bush 2070*
'Grams : Omniplant, Telex, London
STANNINGLEY, NEAR LEEDS *'Phone : Pudsey 2241*
'Grams : Coborn, Leeds
And at Kingsbury (Nr. Tamworth) • Manchester • Glasgow
Morriston, Swansea • Newcastle • Belfast • Sheffield • Southampton
Bath • Dunfermline

THE 600 GROUP OF COMPANIES

P/516/HP13(WWB)

Specialist **TOOLMAKERS TO THE PLASTIC INDUSTRY**

INJECTION and COMPRESSION MOULD MAKING
18 YEARS' EXPERIENCE

LEAVER & HILDRICK

16, MANOR RD., STOKE NEWINGTON, LONDON, N.16
TELEPHONE : STAMFORD HILL 8977

WELL-KNOWN
PLASTIC MOULDERS
in
GREAT BRITAIN

of Compression and Injection mouldings are interested in obtaining a financial interest in a South African concern. Capital, Machinery and Moulds would become immediately available.

Write in confidence to **Box P.661,**
c/o "PLASTICS," Bowling Green Lane, E.C.1

INDEX TO ADVERTISERS

Name	Page
A	
Alfa Plastics, Ltd.	48
Almex, Ltd.	51
Associated Lead Manufacturers, Ltd.	45
Axon & Harrison, Ltd.	50
B	
Bakelite, Ltd.	26
Ball, W. W., & Sons, Ltd.	44
Barber & Duffy, Ltd.	52
Birkby's, Ltd.	1
Blackfriars Rotary Cutters, Ltd.	34
Box P.661	56
Bradley & Turton, Ltd.	36
Bridge, David, & Co., Ltd.	19
Bridges, F. W., & Sons, Ltd.	53
British Celanese, Ltd.	25
British Ermeto Corporation, Ltd.	47
British Geon, Ltd.	3
British Industrial Plastics Ltd.	Inside Front Cover
British Moulded Plastics, Ltd.	28
British Resin Products, Ltd.	30
BX Plastics, Ltd.	Front Cover
Byson Appliance Co., Ltd.	50
C	
Calderon, M., Ltd.	48
Carpenter, J. H., & Son, London, Ltd.	50
Carter Gears Ltd.	52
Chamberlain & Willows	52
Cohen, George, Sons & Co., Ltd.	40 & 56
Cole, E. K., Ltd.	9
Cole, R. H., & Co., Ltd.	32
Courtaulds, Ltd.	31
Creators Ltd.	51
Crystalate, Ltd.	5
D	
Daniels, T. H. & J., Ltd.	4
Davidson's (Manchester), Ltd.	46
Davis Bros. (Metal & Plastics) Ltd.	42
Derwent Plastics, Ltd.	24
E	
Erinoid, Ltd.	Back Cover
Ether, Ltd.	22
Evans, Frederick W., Ltd.	52
F	
Farmer, Leopold, & Sons	35
Ferguson, James, & Sons, Ltd.	Inside Back Cover
Finney Presses Ltd.	43
Firth, Thos., & John Brown, Ltd.	16
Funditor Ltd.	53
G	
Galea, Gilbert	50
Gas Council, The	14
General Electric Co., Ltd., The	12
Grist, M. H., (Plastics), Ltd.	47
H	
Haigh, John, & Co., Ltd.	44
Harris, Alfred, & Co. (Richmond) Ltd.	45
Herbert, Alfred, Ltd.	4
I	
Imperial Chemica lIndustries, Ltd.	23
Industrial Plastics, Ltd.	44
Insulation Equipments, Ltd.	18
K	
Kent Mouldings	36
L	
Lacrinoid Products, Ltd.	21
Lavino (London), Ltd.	41
Leaver & Hildrick	56
London & Scandinavian Metallurgical Co., Ltd.	48
M	
Marshall, C. & C., Ltd.	56
May & Baker, Ltd.	6
M.C.M. (Tools), Ltd.	48
Melwood Thermoplastics, Ltd.	11
Micanite & Insulators Co., Ltd., The	37
Morton Machine Co., Ltd.	10
N	
Nu-Swift, Ltd.	52
P	
Page, Chas., & Co., Ltd.	50
Pascall Engineering Co. Ltd., The	44
Pignon Plastics, Ltd	38
Plastic Engineers, Ltd.	34
Polythene, Ltd.	48
Power Flexible Tubing Co., Ltd., The	42
Projectile & Engineering Co., Ltd., The	39
R	
Radio Heaters, Ltd.	46
Reliance Trading Company	48
Roanoid Plastics Ltd.	17
Rootes Mouldings, Ltd.	13
S	
Sale, H. B., Ltd.	41
Shaw, Francis, & Co., Ltd.	2
Steele & Cowlishaw, Ltd.	46
Sterling Moulding Materials, Ltd.	49
Stevens, Michael S.	50
Stewart Plastics, Ltd.	43
Streetly Manufacturing Co., Ltd., The	29
Surridge's Patents, Ltd.	15
Synthite. Ltd.	35
T	
Thompson & Norris Mnfg. Co., Ltd.	38
Tyne Truck & Trolley Co., Ltd.	46
U	
U.K. Plastics, Ltd.	49
United Ebonite & Lorival, Ltd.	7
Universal Tools, Ltd.	22
Utilex, Ltd.	40
W	
Welwyn Plastics, Ltd.	20
Wickman, A. C., Ltd.	8
Windsor, R. H., Ltd.	33

Printed in England and Published Monthly by the Proprietors, TEMPLE PRESS LTD., BOWLING GREEN LANE, LONDON, E.C.1.
Annual subscription rate 34/- (Canada and U.S.A. $5.50). Shorter periods pro rata. Registered for transmission to Canada and Newfoundland by magazine post. AGENTS ABROAD—EUROPE—Messageries Dawson (S.A.), Paris ; Messageries Hachette et Cie, Paris ; W. H. Smith & Son, Paris and Brussels. U.S.A.—International News Co., New York. CANADA—Wm. Dawson Subscription Service Ltd., Toronto ; Gordon & Gotch Ltd., Toronto AFRICA—Central News Agency, Ltd., Cape Town ; W. Dawson & Son (S.A.), CapeTown. ASIA—W. Thacker & Co., Ltd., P.O. 190, Bombay. AUSTRALIA and NEW ZEALAND—Gordon & Gotch (A'sia) Ltd.

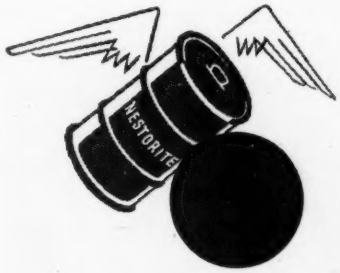
The Ferguson Tradition

THE VIRTUE OF PERSISTENCE

When we were quite young, we remember our Great Grandpa telling us how his Great Grandfather told him that Ferguson's were distantly connected with Bruce and the Spider.

Although cold logic suggests the impossibility of our having descended from spiders, yet—strangely enough —one spider-like characteristic persists amongst our Technicians . . . they never acknowledge defeat and will try and try again until they solve a problem.

The Nestorite Technical Organisation looks upon each and every difficulty merely as "a something" to be overcome. It is a challenge to their ingenuity, and they accept it with positive relish.



Can you wonder that the number of Moulding Firms who pass their seemingly insoluble problems to our Experts is increasing?

Of course, it's all a matter of *personal* attention, plus a passion for detail.

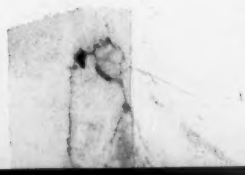
THE SERVICE IS RIGHT WITH NESTORITE

JAMES FERGUSON & SONS LTD.

LEA PARK WORKS, PRINCE GEORGE'S RD., MERTON ABBEY, LONDON S.W.19.

Telephone MITCHAM 2283 (5 LINES) Telegrams NESTORIUS SOUPHONE LONDON

A. S. HARRISON & CO. Pty. Ltd., 85, Clarence St., Sydney, Australia.
ANDRE BERJONNEAU, 134, Avenue de Villiers, Paris 17, France.
JOSE DELCLOS, Angel Baixeras, 39, Barcelona, (2), Spain.
EINAR HOLMARK 19, G1. Kongeyej, Copenhagen V, Denmark.



The Woodchester Mosaics

symbolize the skill and fine materials for which the Stroud Valley is famous —from West of England Cloth

to Erinoid Plastics

ERINOID LIMITED
STROUD, GLOS., ENGLAND

ROMAN PAVEMENT OPEN—JULY 10th TO AUGUST 18th